CLINICAL
EXCELLENCE
COMMISSION

CHARTBOOK 2010

Safety and quality of healthcare in NSW

July 2012

MISSION AND VISION

Mission

The mission of the Clinical Excellence Commission is to build confidence in healthcare in NSW by making it demonstrably better and safer for patients and a more rewarding workplace.

Vision

The CEC will be the publicly respected voice providing the people of NSW with assurance of improvement in the safety and quality of healthcare.

Please note that, as with all large statistical reports, there is the potential for minor revisions of the data in *Safety and Quality of Healthcare in NSW – Chartbook 2010* over its life. Please refer to the latest online version at www.cec.health.nsw.gov.au. Errata, if required, will also be published at this site.

CHARTBOOK 2010

Safety and quality of healthcare in NSW

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FOREWORD

I am pleased to introduce the fourth volume in the Chartbook series: *Chartbook 2010*. The information is designed for clinicians, their patients and the community at large. It is just one of the ways that the Clinical Excellence Commission (CEC) has implemented to "build confidence in healthcare in NSW by making it demonstrably better and safer for patients and a more rewarding workplace." This is our mission. Accurate information is essential for wise decisions. It is our ambition to provide accurate information to the community, to those who need our services in healthcare, to health system managers and governments. A grand objective, but one well worth the effort.

The staff of the CEC has gathered information and opinion from a wide variety of sources and experts. In particular, we have appreciated the involvement of the Agency for Clinical Innovation (ACI), the Bureau of Health Information (BHI), the Cancer Institute NSW and the staff of NSW Health, including the Chief Health Officer. All have taken great care to provide relevant and timely information of use to local health districts.

In addition to reporting on the processes and outcomes of healthcare, *Chartbook 2010* also seeks to understand the patient experience. We have recognised the differences and distances between communities across the State. The trends and information reported also provide evidence of initiatives of the CEC and clinicians throughout NSW, as they aim to improve the quality and safety of clinical care.

We have significantly revised the chapters on circulatory disease, cancer services and Aboriginal health and added additional charts. Others, whose relevance has changed, have been deleted.

We have again asked experts to provide commentary on the charts to guide the analysis of the reader. Charts, however, are not the only source of information. These reports should be read in conjunction with other reports from BHI, ACI, the Chief Health Officer, the Cancer Institute NSW and NSW Health.

The CEC is constantly evaluating our publications and we encourage you to provide advice on how to make this more useful to you and your needs. You can provide information directly by email at chartbook@cec.health.nsw.gov.au

These charts will generate discussion and that discussion may well generate change. Both of these steps underpin the importance of this volume.

Clifford F Hughes, AO
Clinical Professor
Chief Executive Officer

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EXECUTIVE SUMMARY

Across NSW, people want to be confident that they will get high quality, safe healthcare when they need it. Patients in need of immediate or ongoing services want compassionate care that meets their needs. Their healthcare providers want to offer the best possible care. All these people share a need for information, so that they can be assured that care is high quality, they can make informed choices and work to make services demonstrably better.

NSW has one of the better public healthcare systems in the developed world. Its doctors, nurses and other clinical staff are well trained, skilled, caring and dedicated. Each day thousands of people receive care in emergency departments and hospitals. In order to inform efforts to make healthcare demonstrably better and safer for patients, the Clinical Excellence Commission (CEC) put together a team of experts to create this chartbook, aiming to:

- Provide an overview of five-year trends in quality and safety across the NSW health system, to demonstrate historic improvements and identify areas requiring continued attention
- Offer insights that guide efforts to improve care
- Highlight variations in care and outcomes on the basis of geography or socio-economic status
- Provide commentary on the findings, so that healthcare professionals across the State can use the data to guide improvement
- Report on the progress of key initiatives of the CEC and the Ministry of Health that address quality and safety issues.

Chartbook 2010 contains chapters on clinical areas, including circulatory disease (Ch 5), and orthopaedic care (Ch 6). It also provides coverage of many services, such as emergency care (Ch 4), maternity services (Ch 9), mental health services (Ch 14) and ambulance, as well as information on initiatives to improve quality and safety (Ch 16). Importantly, this edition offers new insights regarding cancer care and Aboriginal health.

Chartbook 2010 is a window into a complex system of care. Across the collection of indicators included, the CEC team and the Chartbook Advisory Group thought it important to offer a broad scope of information. From the selected charts, many insights emerged.

Chapter 2: Population Health and Primary Healthcare

- **Falls-related hospitalisations.** Between 2005 and 2009, there was an increase in the rate of falls hospitalisations in those over 65, from 4,593 to 5,299 per 100,000 population.
- **Ambulatory care sensitive conditions.** The rate of hospitalisation for ambulatory care sensitive conditions increased from 2,396 per 100,000 population in 2005, to 2,452 in 2010. Rates vary across local health districts.

Chapter 3: Patient Experience

- **Overall ratings by emergency department patients and outpatients from the *NSW Health Patient Experience Survey*.** Most ED patients who completed the survey rated overall quality of care as excellent (26 per cent), very good (32) or good (25). Most surveyed outpatients rated the overall care they received as excellent (32 per cent), very good (34), or good (25).
- **Care experiences associated with excellent and fair/poor ratings: emergency department patients and outpatients.** Among surveyed outpatients, the factors found to be most closely associated with ratings of excellence were organisation of clinic, courtesy of healthcare professionals and completeness of care. The factors most closely associated with ratings of fair/poor were waiting times, staff teamwork and completeness of care. For ED patients, the factors most closely associated with ratings of excellence were staff courtesy, completeness of care and waiting times. The factors most closely associated with ratings of fair/poor were waiting times, completeness of care and staff courtesy.

Chapter 4: Emergency Care

- **Emergency department (ED) waiting times.** In 2010, national ED performance benchmarks were achieved for NSW for all triage groups except category 3

(potentially life-threatening) patients. EDs in only four local health districts were able to achieve the 75 per cent benchmark for category 3.

- **Timely admission from EDs.** In 2010, 65 per cent of patients in EDs were admitted within eight hours. By comparison, 71 per cent were admitted in 2006. Performance varied across local health districts and two achieved the 80 per cent benchmark.

Chapter 5: Circulatory Disease

- **Admission for acute myocardial infarction.** Between 2005 and 2009, the rate of admissions due to acute myocardial infarction (AMI) reduced from 234 to 221 per 100,000. Rates vary across local health districts, are higher in remote and very remote regions and for those in more disadvantaged socio-economic quintiles.
- **Cardiovascular procedures.** Between 2007 and 2010, the number of hospitals reporting cardiovascular procedures to the Australian and New Zealand Society of Cardiac and Thoracic Surgeons data collection (ANZSCTS), increased. The number of procedures reported by hospital varies by year. In 2010, the number of procedures reported varied between 255 and 620.

Chapter 6: Orthopaedic Care

- **Provision of hip replacement procedures.** There was an increase in the rate of hip replacements from 455 in 2005, to 468 in 2009, per 100,000 population aged 65 and above. There was wide variation across local health districts.
- **Provision of knee replacement procedures.** The rate of knee replacements for people aged 65 and above increased from 711 per 100,000 in 2005 to 734 in 2009. It varies across local health districts.

Chapter 7: Respiratory Disease

- **Asthma hospitalisations.** Between 2005 and 2009, the admission rate for asthma for people aged 5 to 34 varied between 131 and 115 per 100,000.
- **Chronic obstructive pulmonary disease (COPD) hospitalisations.** Between 2005 and 2009, the admission rate for COPD marginally declined from 246 to 238 per 100,000. Rates varied across local health districts and were higher in Murrumbidgee and Western NSW.

Chapter 8: Endocrinology

- **Diabetes hospitalisations.** Between 2005 and 2009, the rate of admission for people with a primary diagnosis of diabetes increased from 313 to 345 per 100,000. Significant differences were observed between local health districts.
- **Amputations for people with diabetes.** Between 2005 and 2009, the rate of amputations below the knee for people with diabetes remained steady at around 11 per 100,000.

Chapter 9: Maternity Services

- **Timely initiation of antenatal care.** Between 2005 and 2009, the proportion of mothers starting antenatal care prior to 20 weeks gestation increased from 88.3 to 92.8 per cent.
- **Caesarean section rates.** Between 2005 and 2009, the caesarean section rate among women giving birth for the first time increased from 29.4 to 31 per cent. The rate of vaginal deliveries after primary caesarean stayed approximately constant at 13.6 per 100,000.
- **Episiotomy rates and 3rd and 4th degree perineal tears for first births.** In 2009, 27 per cent of all vaginal first births involved episiotomy. Considerable variation in episiotomy rates was observed across local health districts. Between 2005 and 2009, the percentage of vaginal first births with 3rd or 4th degree tears increased from 3.5 to 4.5 per cent.
- **Normal births (unassisted vaginal deliveries without epidural).** In 2009, 34.3 per cent of selected primipara births were classed as normal (spontaneous, unassisted). This rate did not change significantly between 2005 and 2009.
- **Well-being at birth for term infants.** Between 2005 and 2009, the percentage of live term infants with a 5-minute Apgar score (a 1-10 scale of infant well-being) of

less than, or equal to, six (i.e., poor infant well-being), was constant at 1.4 to 1.5 per cent.

Chapter 10: Neonatal Intensive Care Services

- **Registration of NICUS babies.** In 2009, 2,517 babies who were born to mothers usually resident in NSW met the NICUS registration criteria and were admitted to a neonatal intensive care unit in NSW or the ACT. This constitutes 2.7 per cent of all live births, an increase from the 2.4 per cent observed in 2005. There appears to be little variation between local health districts.
- **Survival of NICUS babies.** Of babies who met the primary NICUS registration criteria in 2009 and were born at less than 32 weeks gestation, 92.6 per cent survived to hospital discharge. There was little variation between local health districts.

Chapter 11: Other Acute Services

- **Hysterectomy rates.** Between 2005 and 2009, the rate of hysterectomy procedures (excluding cancer) for women in NSW declined. The rates in 15-34 year-old women vary by local health districts and are notably higher in non-metropolitan areas.
- **Myringotomy rates (under 15 years).** Between 2005 and 2009, myringotomy rates for children aged less than 15 years fluctuated from 429 to 527 per 100,000. There was significant variation between local health districts, with higher rates in Northern Sydney and Central Coast.
- **Cataract and lens procedure rates.** Between 2005 and 2009, rates of lens and cataract procedures for those aged 65 and over fluctuated from 5,567 to 5,745 per 100,000. There were significant differences between local health districts' use of cataract surgery. Rates were lower in Southern NSW and Western Sydney.
- **Waiting for booked treatment.** In NSW overall, the number of category 1 and 2 patients waiting more than 30 days for booked treatment increased slightly, from 178 in 2009 to 355 in 2010. The number of ready-for-care patients in all categories waiting longer than one year fell from 1,657 to 331 in the same period. The average clearance time for ready-for-care patients has increased slightly to 3.1 months. In 2010, hospitals in the Nepean Blue Mountains local health district had the longest clearance times (4.2 months) while Sydney Children's Hospital Network and St Vincent's Hospital Network had clearance times of 1 month.
- **Day-of-surgery admission and day-only surgery.** Between 2005 and 2009, the day-of-surgery rates increased from 90.1 to 93.5 per cent, exceeding the State benchmark of 90 per cent. In the same period, the rate of day-only surgery declined from 56.2 to 55.1 per cent, below the benchmark rate of 60 per cent.

Chapter 12: Aboriginal Health

- **Acute myocardial infarction (AMI) hospitalisations**. Between 2005 and 2009, the rate of hospitalisation for AMI in Aboriginal people was 359 per 100,000. This is significantly higher than the standardised rate for the non-Aboriginal population of NSW (135.5 per 100,000).
- **Asthma hospitalisations.** During the period 2005 to 2009, 825 Aboriginal people aged 5-34 were admitted to hospitals in NSW with a primary diagnosis of asthma (173 per 100,000), which was significantly higher than the rate for the non-Aboriginal population (118.5 per 100,000).
- **Chronic obstructive pulmonary disease (COPD).** During the period 2005 to 2009, the rate of COPD hospitalisations among Aboriginal people was 639 per 100,000, which was significantly higher than for the non-Aboriginal NSW population (104). The rate for Aboriginal people varies across local health districts.
- **Diabetes hospitalisations.** In 2005-2009, the rate of hospitalisation for diabetes for Aboriginal people (668 per 100,000) was more than three times the rate for non-Aboriginal people (204). The rate for Aboriginal people was highest in non-metropolitan local health districts, ranging from 519 to 994 in Southern NSW and Western NSW respectively.
- **Myringotomy.** Myringotomy rates among Aboriginal children aged 15 years or under (388.5 per 100,000) are lower that the rates in the non-Aboriginal population of NSW (524).
- **Timely initiation of antenatal care.** Over the period 2005 to 2009, the rate of antenatal care (prior to 20 weeks gestation) for Aboriginal mothers (82.2 per cent) was significantly lower than for non-Aboriginal mothers (91.5 per cent).

- **Maternal smoking.** Between 2005 and 2009, almost 50 per cent of Aboriginal mothers smoked during pregnancy, more than three times the rate of maternal smoking in non-Aboriginal mothers.
- **Neonatal outcomes.** Between 2005 and 2009, 12.6 per cent of births to Aboriginal women were pre-term, occurring at less than 37 weeks gestation. This is significantly higher than the 7.2 per cent of pre-term births in non-Aboriginal women. Similarly, during the same time period, 12.3 per cent of births to Aboriginal women were considered low birth weight (less than 2,500 grams),compared with 6.0 per cent of low birth weights in births to non-Aboriginal women.
- **Cancer incidence and mortality.** Between 1999 and 2007,rates of lung cancer incidence and mortality in Aboriginal men was almost twice that observed in non-Aboriginal males. Rates of mortality from prostate cancer were higher in Aboriginal men (57.1 per 100,000) compared to non-Aboriginal men in the total population (30.8) despite similar incidence rates. Lung cancer incidence in Aboriginal women is almost twice that in non-Aboriginal women, however, mortality rates for Aboriginal women are almost three times as high. While the incidence of breast cancer in Aboriginal and non-Aboriginal women is similar, mortality rates differ significantly - 35.6 per 100,000 for Aboriginal women compared with 23.7 for non-Aboriginal women.

Chapter 13: Cancer

- **Upper gastrointestinal cancers.** Between 2005 and 2008, the annual mean procedure volume at which there was a trend for lower mortality is between 3 and 6 for oesophagectomies, between 2 and 6 for pancreatectomies and 6 for gastrectomies. Hospitals performing each of these procedures, at less than the thresholds provided, may exhibit higher mortality rates.
- **Lung cancer.** Between 2005 and 2008, the annual mean procedure volume at which there was a trend for lower mortality for surgical resection for lung cancer is 15.
- **Colon and rectal cancer.** Between 2005 and 2008, the annual mean procedure volume, at which there was a trend for lower mortality, established for hospitals conducting colon cancer surgeries was 15, for rectal cancer surgeries, 6.

Chapter 14: Mental Health Services

- **Regional self-sufficiency for mental health services.** During the period 2005 to 2009, the level of self-sufficiency of mental health inpatient care across local health districts was consistently high. Observed variation between 2005 and 2009 can be attributed to disaggregation of area health service boundaries.
- **Re-admissions for mental health patients.** Between 2005 and 2009, the re-admission rate for mental health patients was steady at 16 per cent of separations from mental health units. This was above the Royal Australian and New Zealand College of Psychiatrists (RANZCP) benchmark level of 10 per cent.
- **Emergency admission performance for mental health patients.** Between 2005 and 2009, admissions to a mental health bed within eight hours, for people presenting to emergency departments with mental health problems, increased from 65 to 70 per cent. The overall rate of such admissions is below the 80 per cent target.
- **Acute post-discharge community care.** Between 2005 and 2009, the percentage of mental health patients discharged from acute mental health inpatient units and followed-up within seven days by a community mental health team, increased from 50 to 54 per cent. This is well below the target of 70 per cent. A great deal of variability exists between local health districts.

Chapter 15: Ambulance Services

- **Ambulance responsiveness: cardiac, stroke and trauma.** For 2010-11, the Ambulance Service of NSW's combined *activation* and *mobilisation* times for emergency cardiac, stroke and trauma cases were stable. The average *travel time* for emergency cardiac cases (call recorded and arrival at the scene) was 9.4 minutes. This was fairly stable across the ambulance divisions. For trauma emergencies the average travel time for NSW was 10 minutes, varying between divisions. For stroke emergencies, the average travel time is 9.7 minutes - approximately the same across divisions.

Chapter 16: Initiatives in Safety and Quality

- **Strengthening the learning and reporting culture in healthcare – Incident Information Management System (IIMS) notifications.** The number of IIMS notifications which enable the follow-up of hospital incidents has increased each year since the system was established in July 2005. There is substantial variation in IIMS reporting rates across local health districts.
- **Medication Safety Self-assessment (MSSA) Program.** The MSSA program provides a framework to ensure the safe use of medicines. As at June 2011, 76.8 per cent of eligible NSW public hospitals were participating in the program. The lowest rates of participation are recorded for Illawarra Shoalhaven, while all eligible public hospitals in the Mid North Coast, Northern NSW and Far West local health districts participated.
- **Intensive care unit mortality.** Between 2007-08 and 2009-10, the severity of illness of patients treated in NSW intensive care units, as measured by the Australian and New Zealand Intensive Care Society (ANZICS), was essentially the same as pooled Australian data. The Acute Physiological and Chronic Health Evaluation (APACHE) III-J median score is higher, but not statistically significant in NSW metropolitan hospital settings. The standardised mortality ratio (SMR) for NSW follows the reducing trend observed in the pooled Australian data.
- **Blood Watch Program.** Relative transfusion episodes and the relative number of units of red blood cells utilised in NSW in 2009-2010 has reduced since 2008-2009.
- **Hand Hygiene Compliance.** In November 2010, the overall medical staff hand hygiene compliance was 54.9 per cent. This was approximately the same for this time point across the eight former area health services.
- **Quality Systems Assessment (QSA) Program.** More than 90 per cent of respondents to the QSA survey 2010 felt that there was a positive safety and quality culture at their workplace. This trend was observed across the majority of local health districts. More than 80 per cent of NSW respondents felt that management provided a climate for patient safety. More than 70 per cent felt that senior management prioritised patient safety highly.

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CHAPTER 1: Introduction

People in NSW want to be confident that they will get high quality, safe healthcare when they need it. Patients in need of immediate care or ongoing services want compassionate care that meets their needs, and their healthcare providers want to offer the best possible care. These people all need information about healthcare so that they can have confidence and make the best choices.

NSW public health services include more than 220 hospitals, 500 community, family and children's health centres, 220 ambulance stations and an extensive range of other services, including mental health, dental, allied health, public health, Aboriginal health and multicultural health services.

In 2010, NSW Health announced the creation of 18 local health districts (LHDs) to replace the eight former area health services (AHSs). LHDs are a key requirement of the National Health Reform Agreement, finalised in April 2010, effective from 1 January 2011 and are the result of extensive consultation with clinicians and the community. Fifteen will be geographically based, while three will be speciality networks. From *Chartbook 2010* onwards, CEC will report NSW data by LHD, which will include backward projections, enabling five-year trends to be reported. This is the same process adopted in 2007, following the creating of the eight AHSs. While at times it will be necessary to refer to the former AHSs, most references will be to LHDs, including historical time series data.

Following previous editions, work began in 2011 to create *Chartbook 2010* to provide an overview of five-year trends in quality and safety across the NSW health system. The aims are to:

- Offer information to inform efforts to make healthcare in NSW demonstrably better and safer for patients and a more rewarding workplace.
- Offer insights to inform efforts to improve care received by people who live in different health service delivery areas, in urban or rural settings, or in different socio-economic circumstances.
- Provide some perspective on the findings, knowing prospectively that healthcare professionals across the State are best positioned to interpret the data in ways that can inform efforts to improve.
- Report on the progress of key initiatives of the CEC and NSW Health that address quality and safety issues.

Similar to previous editions (available from the CEC website http://www.cec.health.nsw.gov.au/moreinfo/chartbook.html), *Chartbook 2010* spans clinical areas including maternity services (Ch9) and neonatal services (Ch10). It provides coverage of many types of services, such as Aboriginal health (Ch12) and mental health (Ch14) and reports on patient experience (Ch3).

Importantly, *Chartbook 2010* offers new insights on circulatory diseases (Ch5), cancer (Ch13) and trauma response time for the Ambulance Service of NSW (Ch15), as well as new information about initiatives to improve quality and safety (Ch16). Throughout, key indicators have been graphed by local health district and, in some instances, by levels of rurality or socio-economic status. For *Chartbook 2010* there are 33 new charts, and significantly revised chapters on cancer and circulatory diseases chapters.

Chartbook 2010 offers a glimpse into a complex system of care. It does not include information on adverse events, which can be found elsewhere (CEC, 2006; NSWDOH, 2006e).

While great care has been taken to select a broad range of indicators of performance, the capacity to measure and report on important issues is limited by the availability of comprehensive and appropriate information. In future years, this report will be enhanced in ways that parallel increases in the availability and usefulness of data.

NSW health system

The NSW health system includes the Ministry of Health (formerly the Department of Health), the 15 geographical local health districts (LHDs) (see Figure 1), the three specialty networks and several other public health organisations, such as the CEC, and the Cancer Institute NSW. Many of the indicators presented in *The Chartbook* are reported at LHD level. Service utilisation and key demographic characteristics, compared with the NSW and Australian populations are shown by LHD in Table 1. Table 2 shows the availability of beds at public and private hospitals throughout NSW.

Table 1: Demographic characteristics of geographic local health districts, 2010

NSW demographic profile Local Health District	ABS estimated resident population June 30 2010 [1]				Population (%) [1]			Life expectancy at birth (2003-2007) [3]			Aboriginality (30 June, 2010) [1]	
	Male	Female	Persons	%	0-14	15-24	65+	M	F	P	Persons	%
Sydney	283,854	286,994	570,848	8	15.5	13.3	11.6	78.5	84.3	81.4	6,212	1.1
South Western Sydney	429,744	438,161	867,905	12.1	22.1	15.3	10.9	79.2	83.9	81.6	13,016	1.5
South Eastern Sydney	413,626	419,476	833,102	11.6	16	13.6	13.6	80.9	85.3	83.2	6,955	0.8
Illawarra Shoalhaven	192,231	193,968	386,199	5.4	18.5	13.5	17.2	79.1	83.8	81.5	9,259	2.4
Western Sydney	411,544	411,372	822,916	11.5	21.4	15	10.1	79.5	84	81.8	12,751	1.5
Nepean Blue Mountains	170,774	174,386	345,160	4.8	21	15.1	10.9	78.7	83.2	81.1	8,465	2.5
Northern Sydney	404,282	428,608	832,890	11.6	17.8	13.3	14.5	81.9	85.5	83.8	2,395	0.3
Central Coast	153,506	163,494	317,000	4.4	19.4	13.2	18.1	78.1	83.2	80.8	6,859	2.2
Hunter New England	435,544	441,395	876,939	12.3	19.1	13.2	16.6	77.8	82.9	80.4	34,480	3.9
Northern	146,183	149,795	295,978	4.1	18.3	11.9	18.6	78.6	83.9	81.3	10,852	3.7
Mid North Coast	104,034	107,547	211,581	3	18.1	11.3	20.5	78.1	83.4	80.8	9,119	4.3
Southern	101,012	99,019	200,031	2.8	18.9	11.5	16.5	78.4	82.9	80.7	5,276	2.6
Murrumbidgee	121,963	119,892	241,855	3.4	20.4	13.2	16.6	77.7	83	80.4	9,142	3.8
Western	135,609	133,864	269,473	3.8	20.7	13	15.8	76.5	81.9	79.1	23,266	8.6
Far West	15,961	15,739	31,700	0.4	18.9	11.6	17.5	n.a.	n.a.	n.a.	3,005	9.5
NSW	3,544,543	3,609,580	7,154,123	100	19	13.7	14.2	79.2	84	81.6	162,177	2.3
AUSTRALIA [2]	**11,101,646**	**11,198,129**	**22,299,775**	**n.a.**	**18.9**	**14.1**	**13.5**	**n.a.**	**n.a.**	**n.a.**	**563,101**	**2.5**

(1) Source: Estimated Resident Population (ERP) and Aboriginal ERP June 30, 2010 for NSW LHDs. Extracted from NSW HOIST

(2) Source: Estimated Resident Population (ERP) and Aboriginal ERP June 30, 2010 for Australia. Extracted from ABS Data Cube

(3) ABS mortality data and population estimates (HOIST). Centre for Epidemiology and Research, NSW Department of Health. Life expectancy at birth, by sex and local health district in NSW, 2003-2007

Within the NSW Patient Safety and Clinical Quality Program, the Ministry of Health is working together with the CEC to increase safety and improve the efficiency and effectiveness of patient care on an ongoing basis. Under the program, a uniform Incident Information Management System (IIMS), implemented in all the former area health services (AHSs), has been in place since May 2005. It allows information on incidents to be electronically captured, analysed and managed. In addition, clinical governance units were established in each of the former AHSs, with clearly defined points of accountability for safety and quality. They continue to operate under LHD boundaries. Quality improvement activities in the NSW health system are occurring at both LHD and State levels. This allows facilities to tackle very specific issues within their systems of care and for the lessons learned to be integrated into Statewide approaches. This ensures that approaches are both comprehensive (Statewide) and specific (tailored to individual health facilities).

Table 2: Health service utilisation of local health districts*, 2010-11

Local Health District/ Specialist Health Network	Estimated Resident Population June 2010 [1]	Hospital Separations, June 2011 [2]		Average Available Public Hospital Beds, June 2011 [3]				Licensed Private Hospital Beds [3]	Emergency Dept Attendances [3]	Non-admitted Patient services [3]
		Public Hospitals	Private Hospitals	Beds Available for Admission from ED	Other Hospital Beds	Other beds	Total [4]			
Sydney	570,848	138,970	58,067	1,246	453		1,699	332	143,469	1,960,043
South Western Sydney	867,905	185,079	49,916	1,336	458	152	1,946	256	222,771	2,193,682
South Eastern Sydney	833,102	153,817	222,756	1,190	511	127	1,828	1,144	186,065	3,122,842
Illawarra Shoalhaven	386,199	95,902	45,322	736	243	4	983	292	136,851	1,272,225
Western Sydney	822,916	146,631	103,682	1,039	548	131	1,718	668	145,207	2,024,561
Nepean Blue Mountains	345,160	66,730	33,036	523	286	113	922	347	103,604	663,182
Northern Sydney	832,890	119,075	256,078	1,142	502	170	1,814	1,660	163,809	2,094,339
Central Coast	317,000	75,144	40,773	683	104	38	825	282	109,472	821,382
Hunter New England	876,939	201,403	120,936	1,770	831	360	2,961	871	377,699	2,603,455
Northern	295,978	96,342	25,638	657	191	71	919	87	188,625	1,140,783
Mid North Coast	211,581	65,707	24,457	438	138	21	597	140	116,556	649,081
Southern	200,031	45,367	2,028	375	134	93	602	4	109,979	541,953
Murrumbidgee	241,855	61,452	40,562	690	151	440	1,281	210	118,636	833,978
Western	269,473	82,143	15,418	712	287	457	1,456	144	205,242	1,099,773
Far West	31,700	7,940	n.a	97	19	24	140	n.a.	31,165	178,092
Sydney Children's Hospital Network	(n.a.)	46,989	(n.a.)	356	66		422	(n.a.)	85,258	953,173
Forensic Mental Health Specialist Network	(n.a.)	308	(n.a.)	188	149		337	(n.a.)	(n.a.)	3,549,833
St Vincent's Health Network	(n.a.)	40,573	(n.a.)	320	148		468	(n.a.)	41,618	599,680
Total NSW	**7,154,123**	**1,629,572**	**1,038,669**	**13,496**	**5,220**	**2,199**	**20,915**	**6,437**	**2,486,026**	**26,302,057**

(1) This includes all gazetted, not just geographic, LHDs

(2) Source NSW HOIST Centre for Epidemiology and Research, NSW Ministry of Health

(3) Data except ERP is for June 2011, as actual LHD data for available beds was not available for 2010. Further definitions of bed counts are provided in the appendix

(4) Source for average available beds, June 2011: Health Statistics, Appendix 4, page 216; NSW Health Annual Report 2010-2011 – Volume One 2011 http://www.health.nsw.gov.au/pubs/2011/pdf/annualreport11_209-226.pdf

Structure of the Chartbook

The Chartbook has been structured to reflect the way clinical services are mainly organised in the NSW health system. As a result, indicators related to a particular group of clinical services appear together, although they may relate to different Dimensions of Quality (see below). This approach was taken to ensure *The Chartbook* is more meaningful to clinicians and also, hopefully, to members of the public. For *Chartbook 2010*, the chapters include:

- Population health & primary healthcare
- Emergency care
- Circulatory diseases
- Patient experience
- Orthopaedic care
- Respiratory diseases
- Endocrinology
- Cancer
- Maternity services
- Neonatal intensive care services
- Other acute services
- Aboriginal health
- Mental health services
- Ambulance services
- Initiatives in safety & quality
- Data sources & methods

Presenting the indicators

For each indicator reported, textual information is presented under the following headings:

Why is this important? Reflecting underlying information about the condition or procedure to which the indicator relates and the rationale for selection.

Findings: Summarises key findings, particularly in terms of time trends and variation between local health districts. For many indicators, additional analyses have been undertaken, but they are not always presented graphically. These are sometimes mentioned in the findings section. For many indicators we examine whether there were patterns evident across a rural-urban dimension or across socio-economic groups.

Implications: Issues that require attention, or further investigation, have been highlighted.

What we don't know: Raises questions highlighting the limit of our knowledge of the impacts of issues and/or the implications thereof.

Graphical information is also presented for each indicator. Figure 2 provides an example of the typical presentation adopted for this report. This approach allows the reader to readily understand trends at the NSW level and within each local health district. In addition the reader can easily compare rates between local health districts. The statistical significance of trends and variations can also be observed.

Each of the charts follows a standard presentation format for ease of comparison between local health districts (see Figure 1). Occasionally there is a need to vary from this format. Reasons for this include showing:

- the effect of rurality and socio-economic status (e.g. Charts 2-3, 2-7, 5-2), or sex (e.g. Charts 12-10 to 12-13),
- public and private care (e.g. Charts 9-3) or,
- emergency and planned (booked or elective) care (e.g. Chart 9-2), or
- because the data is not collected by LHD (e.g. Chart 16-3, 16-4), or
- because the data necessitates a different type of analysis (e.g. Cancer Ch13, Ambulance Ch15), or
- to aggregate small numbers in order to provide sufficient statistical confidence in the results (e.g. Charts 12-1 to 12-9).

Except where noted, the data pertains to the local health district of **usual residence** of the patient (as opposed to the local health district of the hospital of **treatment**). The final year of data presented in *Chartbook 2010* may exclude resident flows for interstate treatment, due to administrative time lags. In some instances (e.g. Southern NSW residents to ACT) these flows represent a substantial proportion. Other affected local health districts include Far West residents seeking treatment in SA, Murrumbidgee patients in Victoria and Northern NSW patients in Queensland.

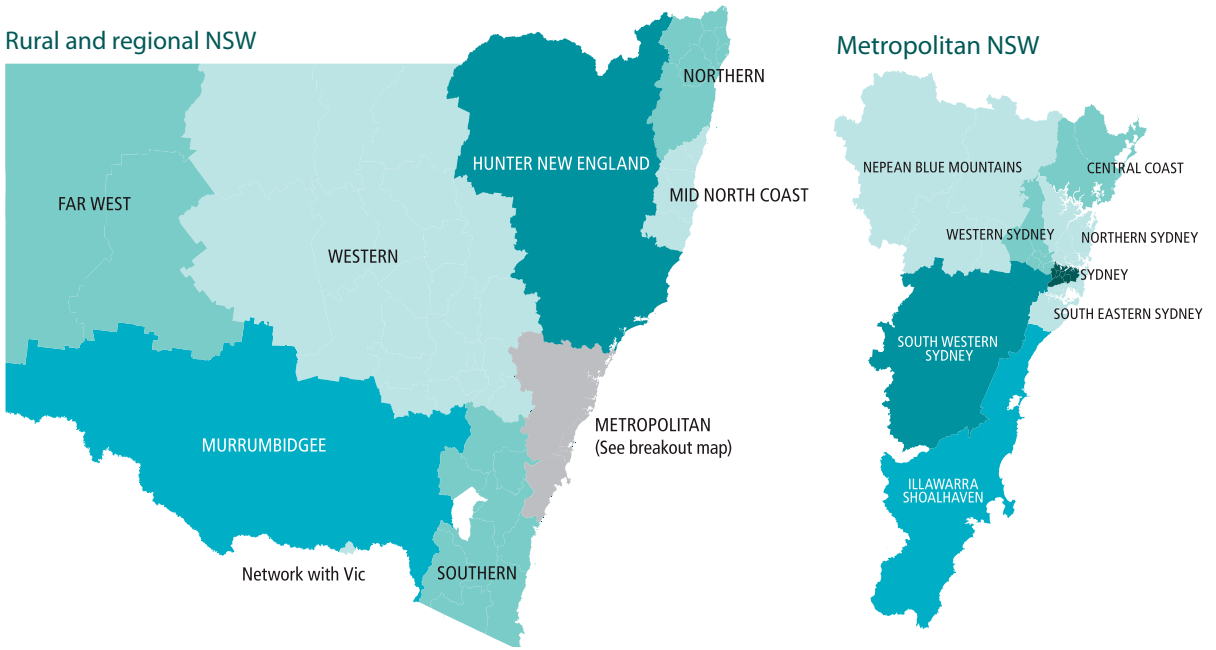
The Six Dimensions of Safety and Quality Indicators for this report have been selected to ensure coverage of all the dimensions of safety and quality. For NSW, the dimensions were initially articulated in *A Framework for Managing the Quality of Health Services in NSW* (NSW Health, 1999). Six primary dimensions were identified:

- **safety** of healthcare
- **consumer** participation in healthcare
- **effectiveness** of healthcare
- **access** to services
- **appropriateness** of healthcare
- **efficiency** of service provision

The document also identified five cross-dimensional issues:

- Competence of providers of healthcare
- Education and training for quality
- Continuity of care
- Accreditation of health services
- Information management to support effective decision-making.

Figure 1: NSW local health district map (2011)



Hospitals within LHDs

METRO

Central Coast
Gosford
Long Jetty
Woy Woy
Wyong

Illawarra Shoalhaven
Bulli
Coledale
David Berry
Kiama
Milton/Ulladulla
Port Kembla
Shellharbour
Shoalhaven
Wollongong

Nepean Blue Mountains
Blue Mountains
Hawkesbury
Nepean
Portland
Springwood
Lithgow

Northern Sydney
Greenwich
Homsby
Manly
Macquarie
Mona Vale
Royal North Shore
Ryde

South Eastern Sydney
Calvary
Prince of Wales
Royal Hospital for Women
St George
Sutherland
Sydney/Sydney Eye Hospital

South Western Sydney
Bankstown
Bowral
Braeslde
Camden
Campbelltown
Fairfield
Liverpool

Sydney
Balmain
Canterbury
Concord
Royal Prince Alfred

Western Sydney
Auburn
Blacktown
Cumberland
Mt Druitt
Westmead

Specialty Networks
Sydney Children's Hospital Network (Randwick and Westmead)
Forensic Mental Health Specialist Network

Additional LHN
St Vincent's and Mater Health Sydney

REGIONAL

Western*
Bathurst
Cowra
Dubbo
Forbes
Mudgee
Orange/Bloomfield
Parkes

Far West*
Broken Hill
Ivanhoe
Menindee
Tibooburra
Wilcannia
Discussions with South Australia may result in a future network arrangement and changes for this geographic area.

Hunter New England*
Armidale
Belmont
Cessnock
Gunnedah
Inverell
John Hunter
Kurri Kurri
Maitland
Morree
Muswellbrook
Narrabri
Newcastle Mater
Singleton
Tamworth
Taree

Mid North Coast*
Coffs Harbour
Kempsey
Macksville
Port Macquarie

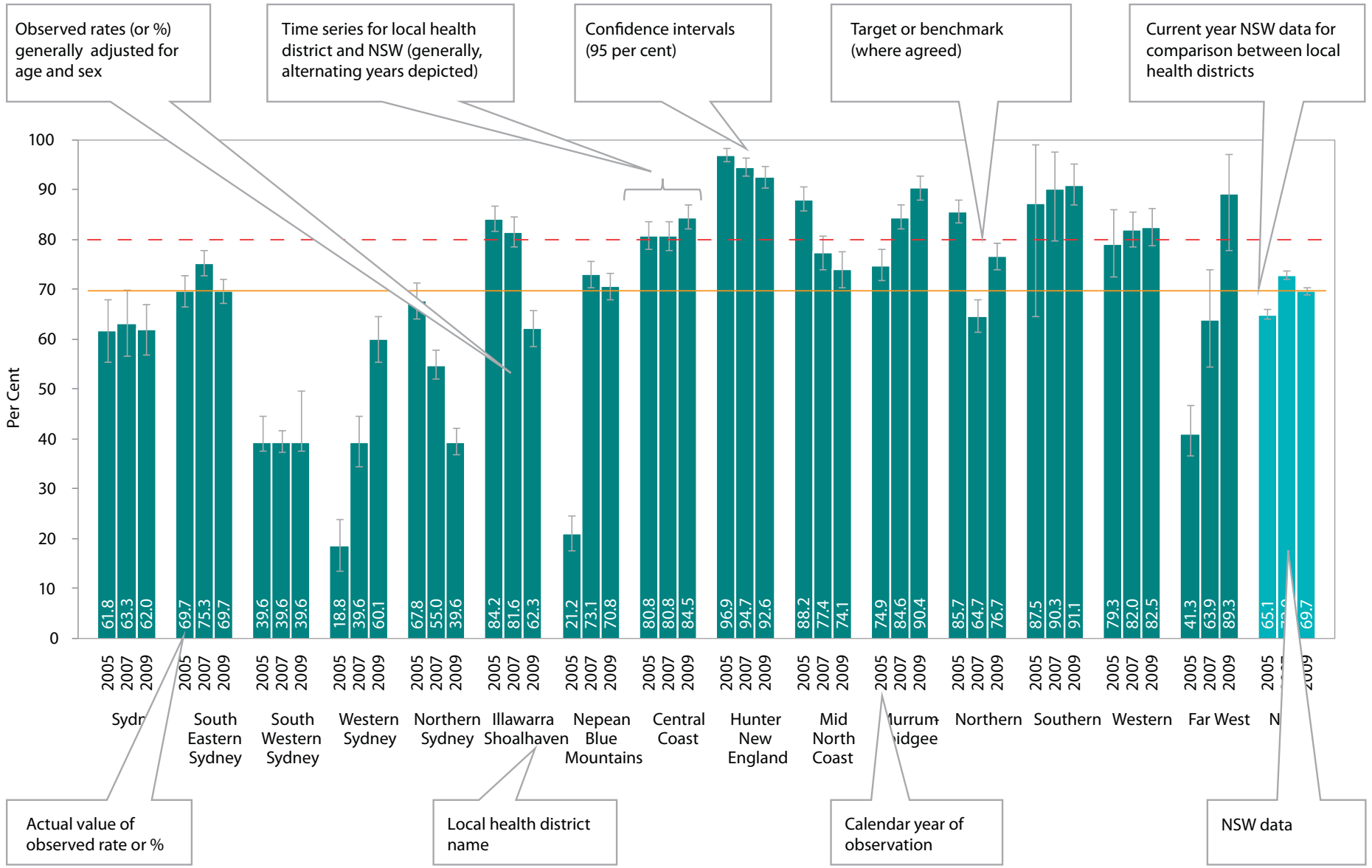
Murrumbidgee*
Deniliquin
Griffith
Wagga Wagga
Wentworth
West Wyalong
Young
May network with Victoria in the future.

Northern*
Ballina
Casino
Grafton
Lismore
Maclean
Murwillumbah
Tweed Heads
Discussions with Queensland may result in a future Network arrangement for this geographic area.

Southern*
Bateman's Bay
Bega
Cooma
Crookwell
Goulburn
Moruya
Queanbeyan
May network with the ACT in the future.

*And a range of other health facilities, including Multi-Purpose Services (MPS)

Figure 2: Sample presentation of data



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POPULATION HEALTH AND PRIMARY HEALTHCARE | Introduction

Chapter 2

Population health services refer to a broad range of public health interventions and organised preventive activities. Public health has been defined as 'the organised response by society to protect and promote health and to prevent illness, injury and disability; the starting point for identifying public health issues, problems and priorities and for designing and implementing interventions, in the population as a whole, or population sub-groups' (NPHP, 1998).

In NSW, activities to promote and protect public and population health are undertaken by the public healthcare system, other government agencies and charitable organisations and private GPs. It is estimated that total government expenditure on public health programs in NSW in 2007-08 totalled $441.1m (AIHW, 2009a). Major areas of expenditure included organised immunisation programs ($199.5 m), communicable disease control ($73.3 m), health promotion ($57.5 m), screening programs ($55.1 m), prevention of hazardous and harmful drug use ($30.2 m), environmental health ($17.2 m) and food standards and hygiene ($4.9 m).

Primary healthcare services include GPs, mainly working in the private sector and a range of community health services provided through the public sector and non-government organisations. In 2008-09, there were 6,792 full-time workload-equivalent GPs working in NSW, an average of 95.9 per 100,000 population. This has increased slightly from 2004-05 (91.7). There is a greater concentration of GPs in urban (100.4 per 100,000), than in rural areas (81.6) (SCRGSP, 2010).

Community health services in NSW are generally provided through community health centres managed by local health districts. They include child, adolescence and family services, youth health, women's health, physical abuse and neglect services, sexual health, aged care, allied health (physiotherapy, occupational therapy, social work and counselling, speech pathology, psychology and audiology), specialist medical services, early childhood nursing, immunisation, post-natal programs, early intervention, school surveillance services, oral health and drug and alcohol services. Non-government organisations also provide a range of services, including Aboriginal health.

This chapter presents data on falls-related hospitalisations and hospitalisation for ambulatory care sensitive conditions (formerly potentially avoidable hospitalisations), provide further insight. They give an indication of relative access and use of health services at a population level and, in so doing, provide a sense of the opportunities to achieve better outcomes through appropriate investments and strengthening of the performance of primary care, ongoing care for chronic conditions and outpatient interventions.

In previous editions of *The Chartbook*, data from the *NSW Population Health Survey* on: overweight and obesity; smoking; immunisations; and, difficulties accessing to healthcare have been presented in this chapter. This year, changes in the administrative boundaries for NSW Heath from area health services (AHSs) to local health districts (LHDs) have meant that population estimates from the *NSW Population Heath Survey* that were sampled for AHS geography are not necessarily representative of new LHD populations. The Ministry of Health (MOH) website for *The 2010 Report on Adult Health in NSW* contains the following caution regarding the use of estimates at LHD level that were originally sampled at AHS-level:

> *"In this report, estimates for local health districts (LHDs) should be used with caution. In 2010 the survey was stratified by the 8 area health services that existed at that time (approx 1,000 adults in each area), but was analysed and reported for the 15 LHDs that came into effect in January 2011. Because of this, the samples vary considerably (from 100 persons in Far West to 1200 persons in Hunter New England).*
>
> *In 2011 the survey was stratified by the LHDs (approx 800 adults in each district) and so the samples are more representative of the LHDs and will provide better estimates. The 2011 estimates will be released soon". http://www.health.nsw.gov.au/publichealth/surveys/hsa/10pub.asp*

For this reason the CEC has opted to remove all *NSW Population Health Survey* based reports at this time. They will be published in a separate supplement as soon as the revised estimates are available. Please note that this advice also pertains to the hospital and emergency department patient satisfaction charts in Chapter 3.

Why is this important? Falls are responsible for 41 per cent of injury-related hospitalisations in NSW (CER, 2011). In 2008-09, there were 50,212 falls-related hospitalisations, which corresponds to a rate of 627 per 100,000 population (all ages). Older people have the highest rates. In 2008-09, almost two-thirds (31,968 or 64 per cent) of all falls-related hospitalisations in NSW were in patients aged 65 years or over (CER, 2011c).

No other single cause of injury, including road trauma, costs the health system more than falls-related injury. The total cost of healthcare associated with falls in NSW in 2006-07 has been estimated at $558.5 million (Watson, Clapperton, & Mitchell, 2011). Around one in three older people living in the community are estimated to fall each year and many fall more than once (Watson, *et al*., 2011). In Australia, almost half of all fall injuries among older people which result in hospitalisation occur in the home, with a further 22 per cent in residential aged care facilities (Bradley C, 2008).

In 2007, a fall was recorded as either the underlying or associated cause of death in 563 NSW residents, a rate of 7.0 per 100,000 population (CER, 2011c). This is likely to be an underestimate (Kreisfeld, 2004). Between 1997 and 2007, the rate of falls-related deaths in NSW increased from 3.5 to 7.0 per 100,000 (CER, 2011c).

Falls injuries in older people place a heavy burden on the hospital system because of the number of affected patients and the long average length of stay. Patients may also require long periods of rehabilitation after acute care. Seven out of ten falls resulting in hospitalisation of older people occur either in the home or in aged care facilities (AIHW, 2008b). Population studies have shown that hip fractures are the most serious falls-related injury in older people, with 15 per cent dying in hospital and one third not surviving beyond one year (McClure *et al*., 2005).

Findings: The chart shows that for people aged 65 and over, the age- and sex-standardised rate of hospitalisations for falls in NSW increased from 4,592.5 per 100,000 population in 2005 to 5,298.7 in 2009. Across local health districts in 2009, rates ranged from 3,062.8 separations per 100,000 in Far West to 6,182.7 in Sydney. Hospitalisations for falls-related hip fractures reduced from 487.5 per 100,000 in 2004 to 439.6 in 2008.

Implications: Effective strategies to prevent falls-related injuries include:

- Identifying and managing risk factors for falls and fall-related injury (including osteoporosis) among older people at risk of falls
- Preventing the development of fall risk factors, such as the promotion of appropriate physical activity and nutrition (including vitamin D and calcium supplementation, where appropriate), medication and vision review.

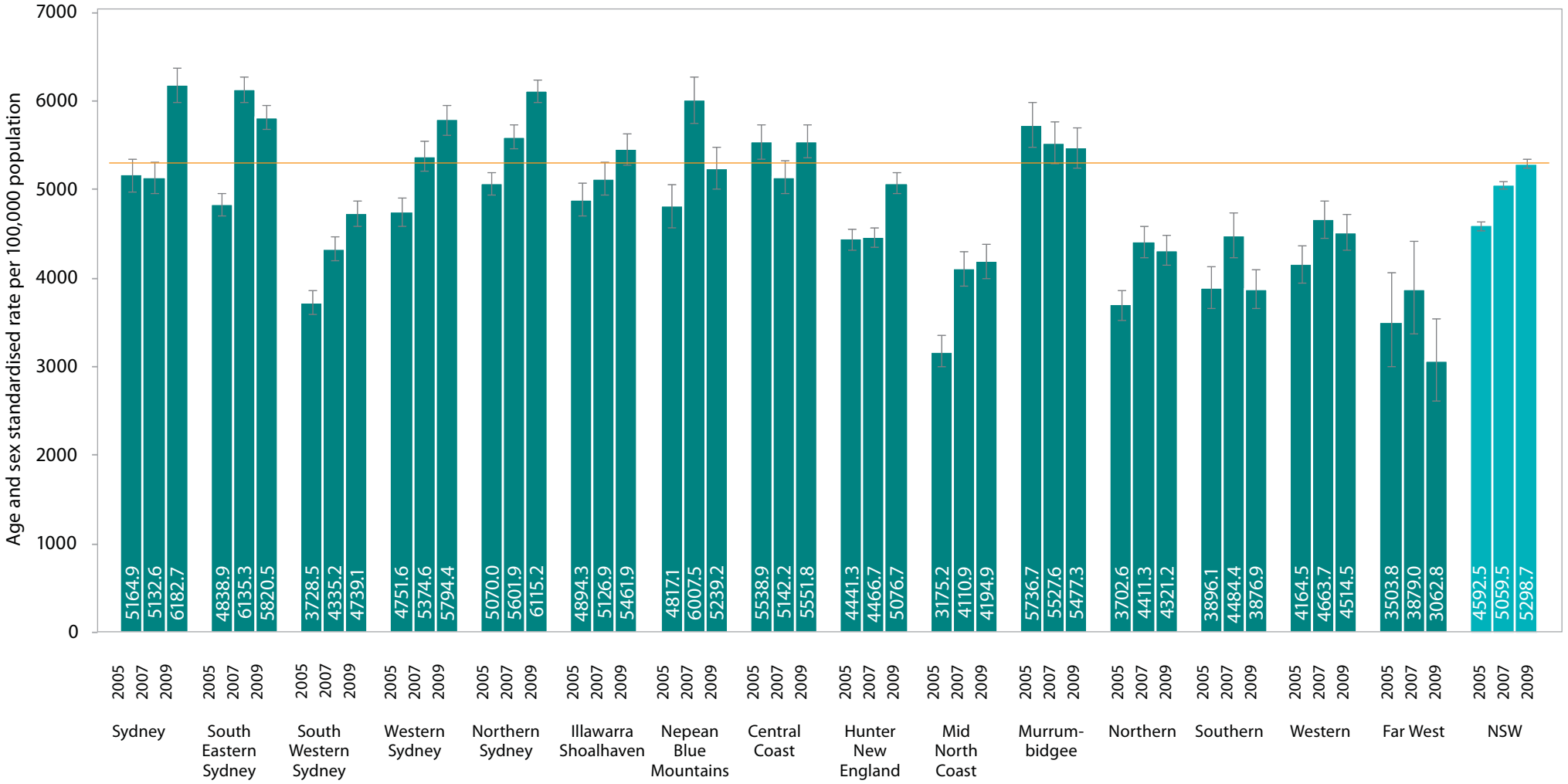
The rate of separations for fall injuries in older men and women has been increasing for the past 10 years. They may be affected by both the actual rate and other factors, such as hospital admission and discharge practices. The NSW Health policy, *Prevention of Falls and Harm from Falls among Older People: 2011-2015,* describes the actions that NSW Health will undertake to support the prevention of falls and falls-related harm among older people. They will take place in three key domains: health promotion, NSW Health clinical services and NSW Health residential aged care services. The policy aims to reduce the incidence and severity of falls among older people and to reduce the social, psychological and economic impact of falls on individuals, families and the community.

What we don't know: Better information is needed about the patient journey beyond the hospital, following a fall. More robust data is needed about falls occurring in residential aged care facilities and other healthcare facilities which are not included in the NSW admitted patient data collection.

Falls hospitalisations

Chart 2-1

Age and sex standardised hospitalisations for falls, persons aged 65 years and over by local health district of residence, 2005-2009

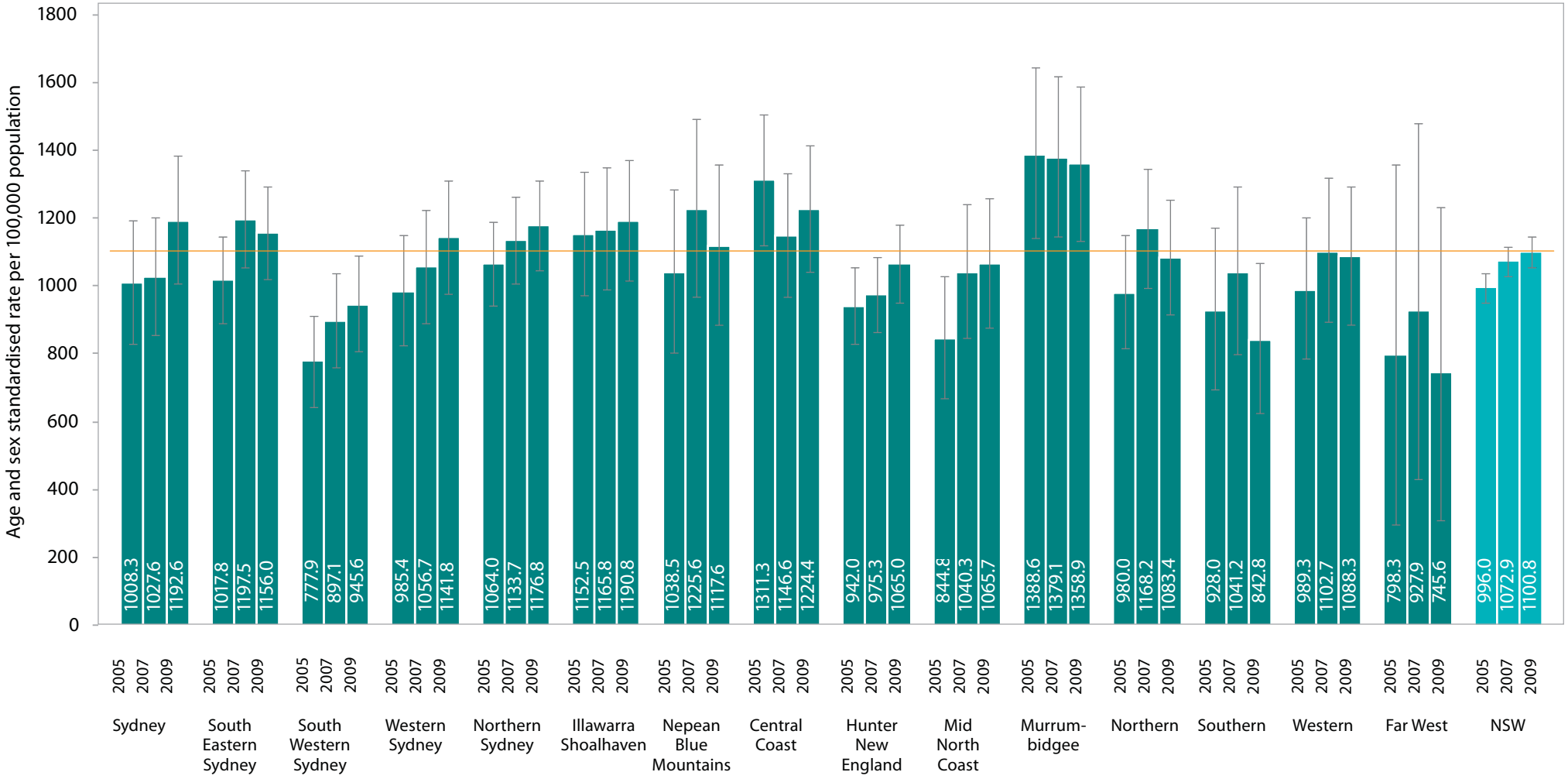


Source: NSW Admitted Patient Data Collection (HOIST), Centre for Epidemiology and Research, NSW Ministry of Health.

Falls hospitalisations, all ages

Chart 2-2

Age and sex standardised falls hospitalisations for all ages, by local health district of residence, 2005-2009

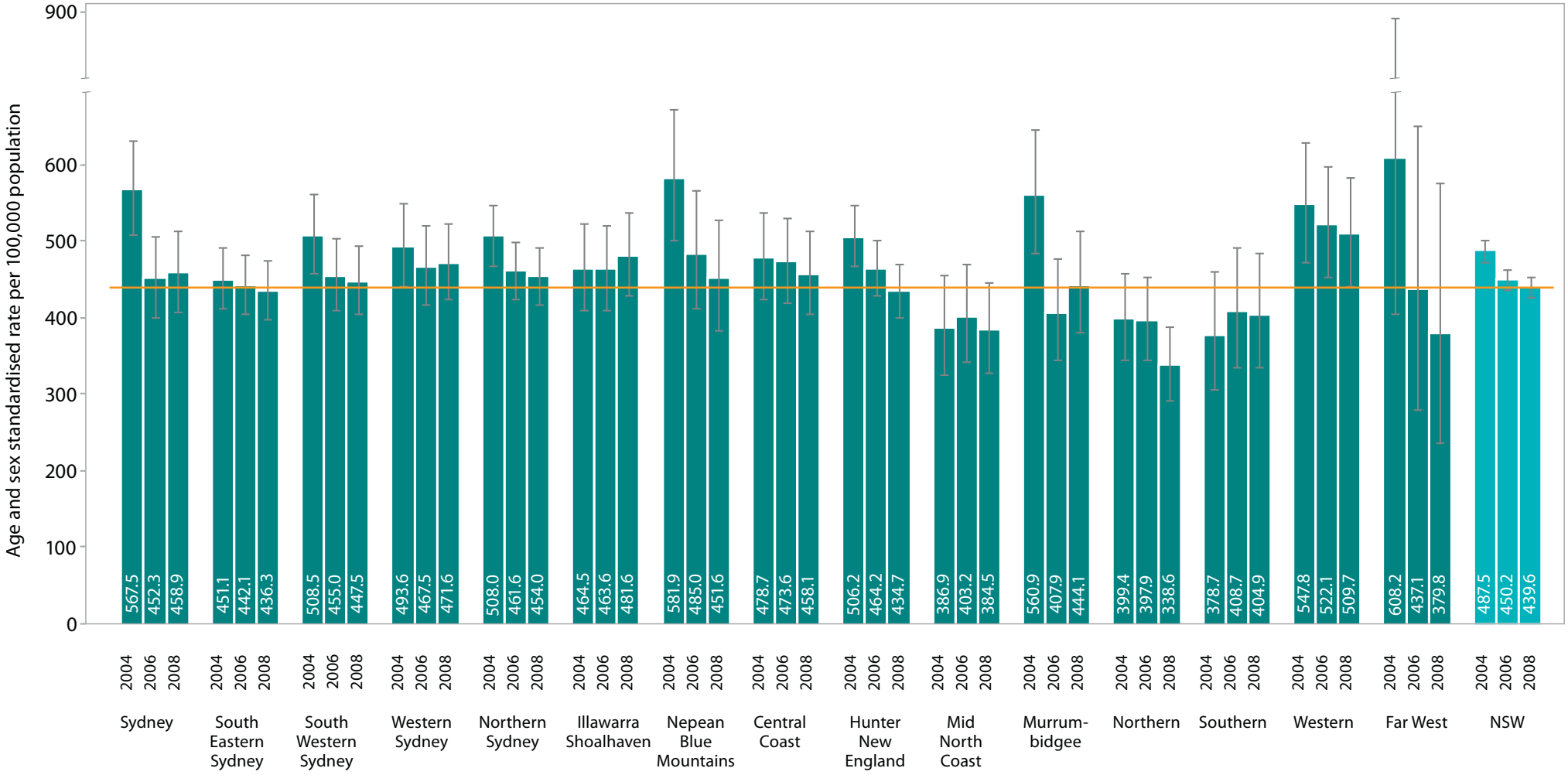


Source: NSW Admitted Patient Data Collection (HOIST), Centre for Epidemiology and Research, NSW Ministry of Health.

Falls-related hip fractures

Chart 2-3

Age and sex standardised hospitalisations for falls-related hip fractures, persons aged 65 years and over by local health district of residence, 2004-2008



Source: NSW Admitted Patient Data Collection linked by the Centre for Health Record Linkage (CHeReL) and ABS Population Estimates (HOIST). Centre for Epidemiology and Research, NSW Ministry of Health.

Why is this important? Analysis of the conditions for which people are admitted to hospital reveals that in many cases the admission could have been prevented if more effective non-hospital care was available, either at an earlier stage in the disease progression, or as an alternative to hospital care. Ambulatory care sensitive conditions (ACSC), also known as potentially preventable hospitalisations, are those conditions for which hospitalisation is considered potentially avoidable through preventive care and early disease management, usually delivered in an ambulatory setting such as primary healthcare. ACSCs include a range of chronic and acute conditions, respiratory infections and/or inflammations, chronic obstructive airways disease, bronchitis and asthma, venous thrombosis, musculo-tendinous disorders, cellulitis, other kidney and urinary tract diagnoses and red blood cell disorders (CER, 2011c). Studies of hospitalisations for these conditions show that the availability of non-hospital care explains a significant component of the variation between geographic areas in hospitalisation rates for the specified conditions (Weissman, Gatsonis, & Epstein, 1992; Bindman *et al*., 1995; Billings *et al*., 1993; AHRQ, 2001). The *NSW 2021 State Plan* includes a target for 2014-15 to reduce the age-standardised rate of potentially preventable hospital admissions by 1 per cent (NSWDPC, 2011). NSW Health has set itself the target of reducing potentially avoidable admissions in public hospitals by 15 per cent over five years (NSWDOH, 2007).

Findings : The age-sex standardised rate of hospitalisation for ACSCs in NSW in 2009 was 2,452 per 100,000 population. Rates per 100,000 population varied significantly across local health districts, ranging from 1,898 in Northern Sydney to 3,484 in Western NSW. Rates of hospitalisation for ACSCs vary by rurality and socio-economic disadvantage. Rates in remote and very remote regions are significantly higher than those in major cities. Rates also increase in the most disadvantaged socio-economic quintiles. Rates for people living in the most disadvantaged regions are almost twice those for people living in the least disadvantaged regions. For example, the disparities in hospitalisation rates associated with rurality and socio-economic disadvantage are clearly apparent in the data presented in *Chartbook 2010* for COPD (Chart 7-2) and in congestive heart failure admissions (BHI, 2011). It should be noted that the data for the Southern NSW LHD appears to contradict this trend, but as noted in Chart 8-1, the data for 2009 does not include substantial resident flows to ACT hospitals.

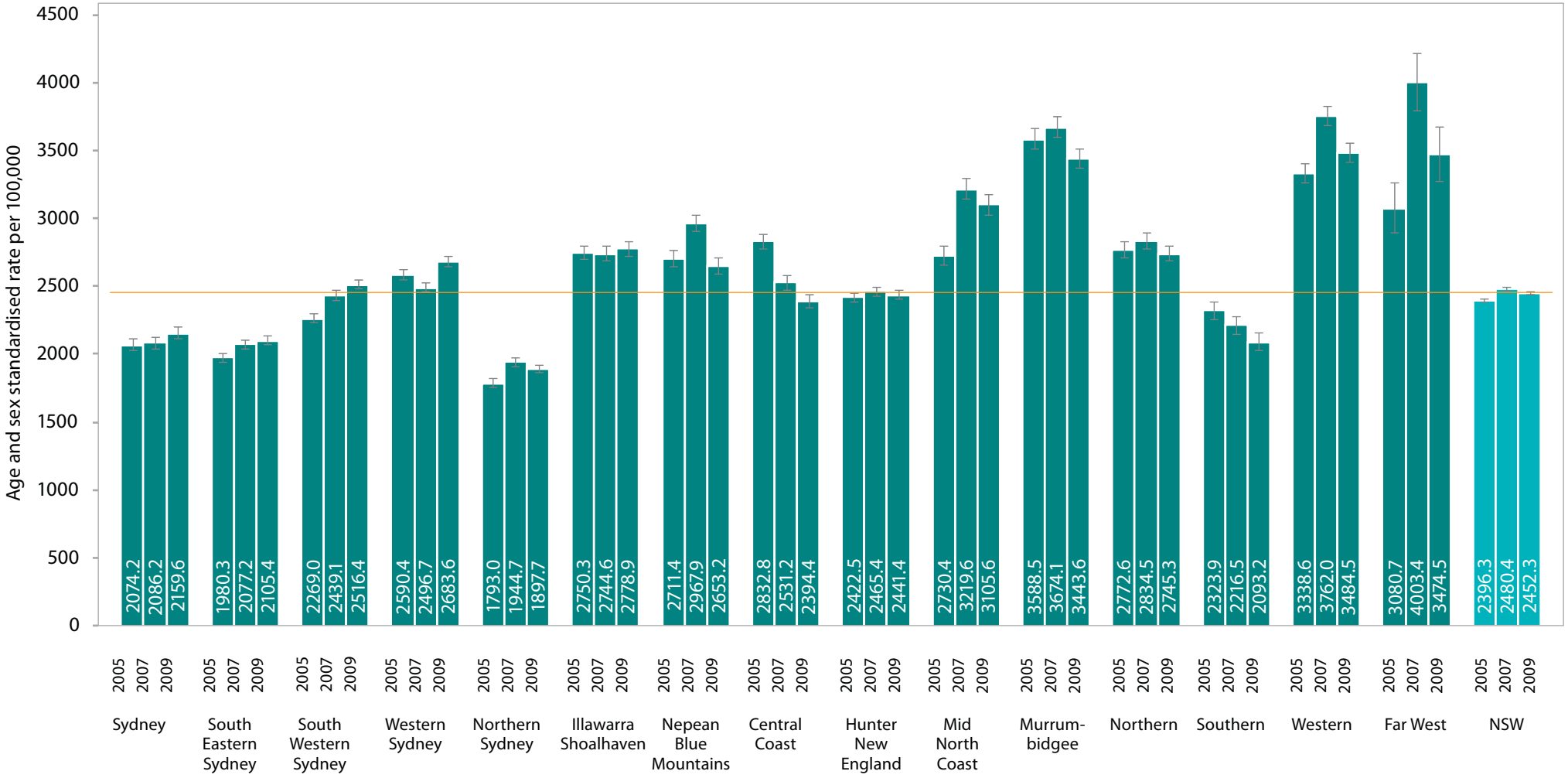
Implications: There is considerable potential to reduce hospitalisation for ACSCs through the provision of stronger and more accessible primary care and out-of-hospital specialist services. This is particularly the case in rural and remote areas, and the most socially disadvantaged populations. High hospitalisation rates highlight the need for strengthening services that intervene earlier in the disease process, particularly at the primary care level. NSW Health and the Agency for Clinical Innovation (ACI) are currently working with local health districts to identify local solutions for local variation in hospitalisation rates for ambulatory sensitive conditions. NSW Health has set a target of 7.6 per cent reduction of potentially avoidable admissions in public hospitals, over the 2006-07 baseline, to 8.5 per cent of total hospital admission by 2014-15. A number of strategies are being implemented to reach this goal, including the *Health Care at Home* initiative, establishment of a number of HealthOne centres (integrated primary and community health centres) and support for approaches that place a greater focus on prevention, early intervention, patient self-management and care co-ordination for frail elderly people (NSWDOH, 2007).

What we don't know: To what extent is the variation between local health districts in hospitalisation rates for ACSCs due to variation in clinical workforce, access to ambulatory care services, variation in clinical practice or other factors?

Hospitalisation for ambulatory care sensitive conditions

Chart 2-4

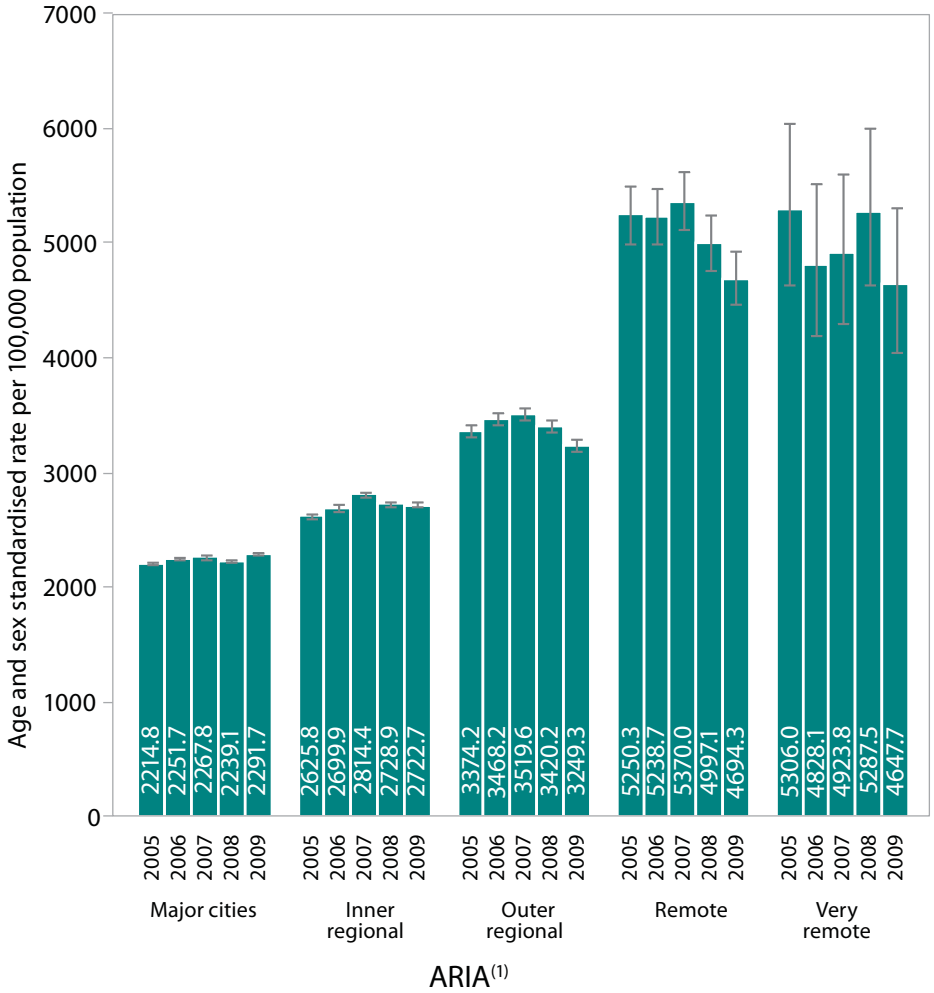
Age and sex standardised rate of hospitalisation for ambulatory care sensitive conditions per 100,000 population by local health district of usual residence, 2005-2009



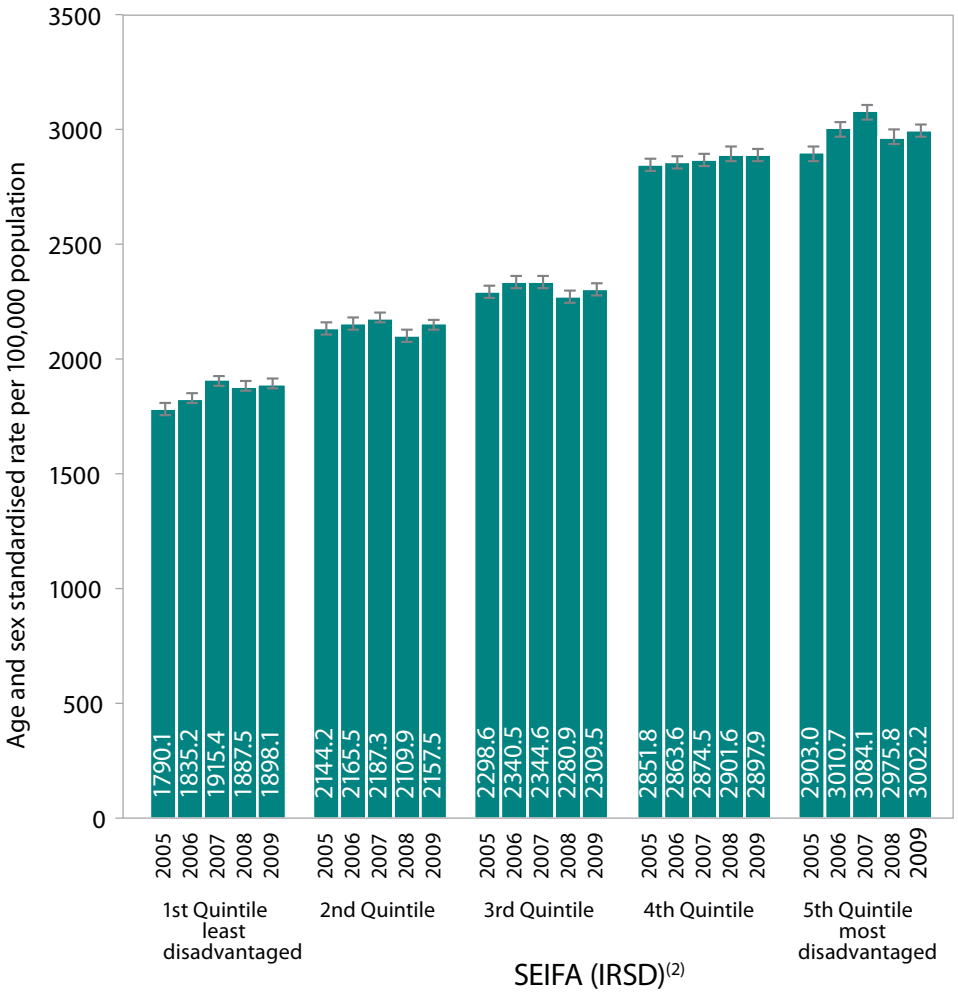
Source: Ambulatory care sensitive conditions (ACS) a subset of NSW Admitted Patient Data Collection (HOIST), Centre for Epidemiology and Research, NSW Ministry of Health (revised classification).

Hospitalisation for ambulatory care sensitive conditions by ARIA[1] and SEIFA (IRSD)[2] Chart 2-5

Age and sex standardised rate of hospitalisation for ambulatory care sensitive conditions per 100,000 population by remoteness region, 2005-2009



Age and sex standardised rate of hospitalisation for ambulatory care sensitive conditions per 100,000 population by socio-economic status quintile (Index of relative socio-economic disadvantage), 2005-2009



Source: Ambulatory care sensitive conditions (ACS) a subset of NSW Admitted Patient Data Collection (HOIST), Centre for Epidemiology and Research, NSW Ministry of Health.
(1) Accessibility/Remoteness Index of Australia, ABS 1216.0 (2006).
(2) Socio-economic Indices for Areas (Index of Relative Socio-economic Disadvantage) ABS 2039.0 (2008).

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PATIENT EXPERIENCE | Introduction

Chapter 3

Quality in healthcare is a multi-faceted concept, encompassing the application of appropriate scientific evidence, diagnostic acumen, timeliness and fairness – all delivered in safe and efficient care environments.

The last two decades, however, have seen a significant evolution internationally in the concept of quality, with a growing recognition of the importance of patient-centredness. This shift has been marked by the increasing use of patient and public surveys to gauge consumers' perspectives on healthcare and to inform managers and policy-makers about perceptions of quality and to guide improvements.

In NSW, there is a strong policy commitment to patient-centredness. The State Plan lists improving customer satisfaction as one of its priority areas and across departments, government organisations are required to collect, report on and respond to customer satisfaction data. Specifically in health, in its response to the *Final Report of the Special Commission of Inquiry into Acute Care Services in NSW Public Hospitals* (Garling 2008), the NSW Government pledged to "develop a culture where the patient is both the heart of the system, and the driver behind every change." (NSWDOH 2009).

This chapter presents data and/or analysis from the NSW Health Patient Survey: every year surveys are mailed to over 180,000 people who accessed public healthcare in NSW. Questions are asked that provide information on each of the eight key dimensions: access to care; patients' preferences; co-ordination of care; information and education; continuity and transition; physical comfort; emotional support and family and friends. In previous years, this survey was administered by NSW Health and from 2012 onwards it will be administered by the Bureau for Health Information (BHI).

PATIENT EXPERIENCE | Overall rating by emergency department patients

Why is this important? Emergency departments (EDs) are a key point of contact for patients accessing the healthcare system and are a gateway to additional healthcare. A systematic review of evidence relating to patient satisfaction in EDs identified three main factors which most influenced patient ratings of overall care: perceived staff interpersonal skills and attitudes and perceived waiting times (BHI, 2010a; Taylor & Benger, 2004). Surveys of patient and community experiences can provide insight into the responsiveness of the healthcare system and, more importantly, help identify opportunities for improvement in health service delivery and policy making.

Findings: *The NSW Health Patient Survey* asks respondents who recently used emergency department services for their own medical care, to rate the care they received. In 2009, 83 per cent of adults rated their care positively (as excellent, very good, or good). A small percentage of respondents rated their care as fair or poor (17% of total). Their rating of the following aspects of their care as fair or poor were:

- excessive waiting time 91%
- completeness of care 80%
- courtesy of staff..... 63%

Implications: Although the proportion of people who rated their care positively was high and remained stable over time, there are opportunities for improvement. Waiting time remains a significant issue to be managed within hospital settings and is a major reason for dissatisfaction with emergency department care. There are significant policy interventions being implemented across NSW to try to address the issue of excessive ED waits. For example, the establishment of clinical initiative nurses in EDs to fast-track patients into wards, as well as new protocols for timely admission, have been implemented (COAG, 2011; NSWDOH, 2009a).

What we don't know: How representative of the total patient population were the subset of those who responded to the survey, in demographic terms and in terms of the outcomes of care?

Overall care rating by emergency department patients

Chart 3-1

NSW Health Patient Experience Survey 2009 - Emergency department patient ratings - Statewide indicators of overall care received, 2009 - standardised scores

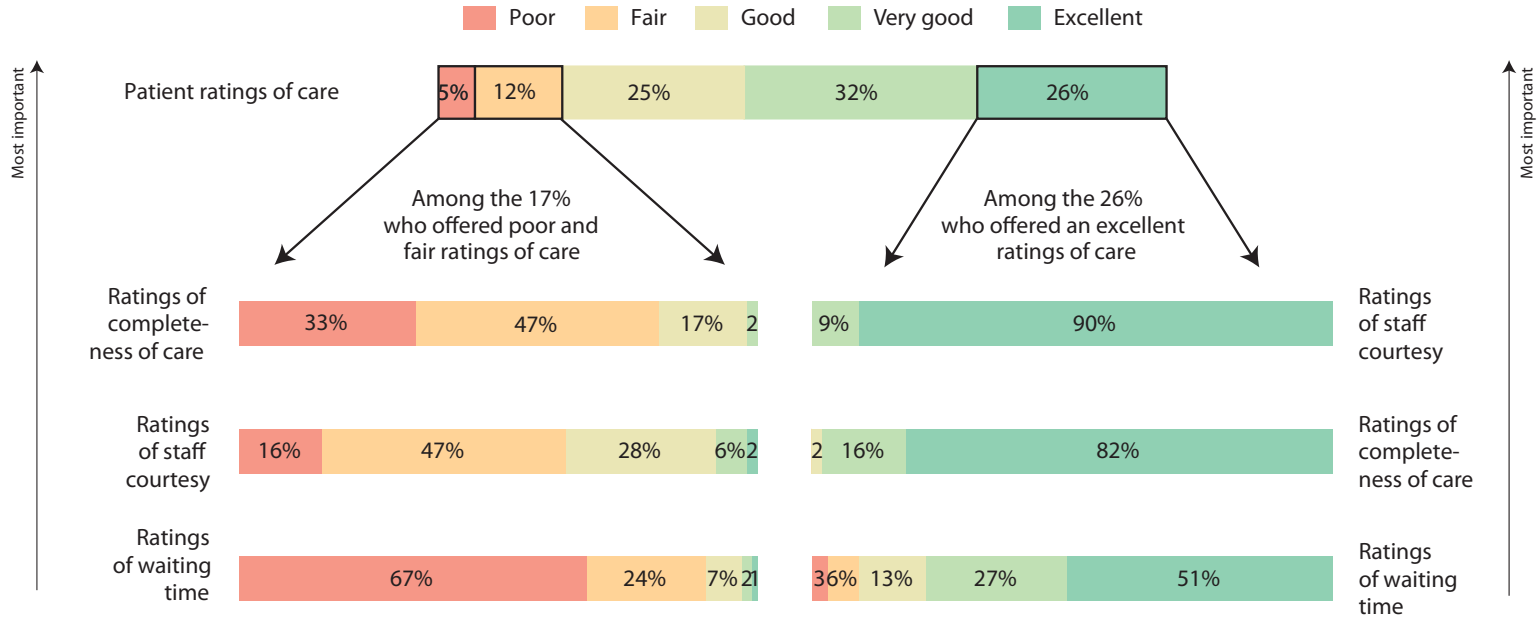
Source: NSW Bureau of Health Information, NSW Health Patient Experience Survey.

Influential care experiences, emergency department patients in 2009, NSW

Chart 3-2

Other significant factors

- Availability of doctors
- Got help whenever needed
- Staff teamwork
- Enough information about care
- Care well organised
- Enough say about care
- Courtesy of doctors
- Availability of nurses
- Had confidence and trust in doctors
- Ease of understanding hospital directions/signs
- Explanation of care
- Staff did everything to control pain
- Easy to find staff to talk to
- Nurses discussed anxieties or fears
- Courtesy of nurses
- Doctors talked as if patient was not there
- Test results explained understandably
- Wait too long for tests
- Delays were explained



Other significant factors

- Staff teamwork
- Availability of doctors
- Explanation of care
- Care well organised
- Got help whenever needed
- Availability of nurses
- Courtesy of doctors
- Wait too long for another doctor
- Enough information about care
- Ease of understanding hospital directions/signs
- Staff helped get messages to family or friends
- Saw a doctor in the emergency room
- Doctors spoke as if patient was not there
- Interpretation available
- Doctors discussed anxieties or fears
- Easy to find staff to talk to

Why is this important? For NSW public hospitals and health services, many services are provided to patients without the need for a hospital admission. Assessment, treatment and follow-up care can be provided on an outpatient basis, anywhere on a hospital campus, or even in the community. Outpatient services are, therefore, an important point of contact for patients accessing the healthcare system and are a gateway to additional healthcare. They can be provided by any medical specialty. Outpatient clinics are used to assess and inform patients prior to surgery, conduct medical investigations, such as blood tests, ultrasound and x-rays, provide treatments, follow-up care after a hospital admission and manage patients with chronic and complex conditions.

Findings: In February 2010, 7,500 people who received outpatient services in NSW public hospitals responded to *The NSW Health Patient Survey*. Of those, 6,500 outpatient responses were used in the analysis (BHI, 2010). Overall, 66 per cent of respondents rated the care they received in the outpatient clinic as very good or excellent and 91 per cent as good, or better.

Patients were also asked for their perception of various aspects of the service provided to them. For the nine per cent who rated their care as poor or fair, 80 per cent felt that they had to wait too long in the waiting room and 24 per cent rated the completeness of their treatment and the teamwork of the health professionals treating them as poor.

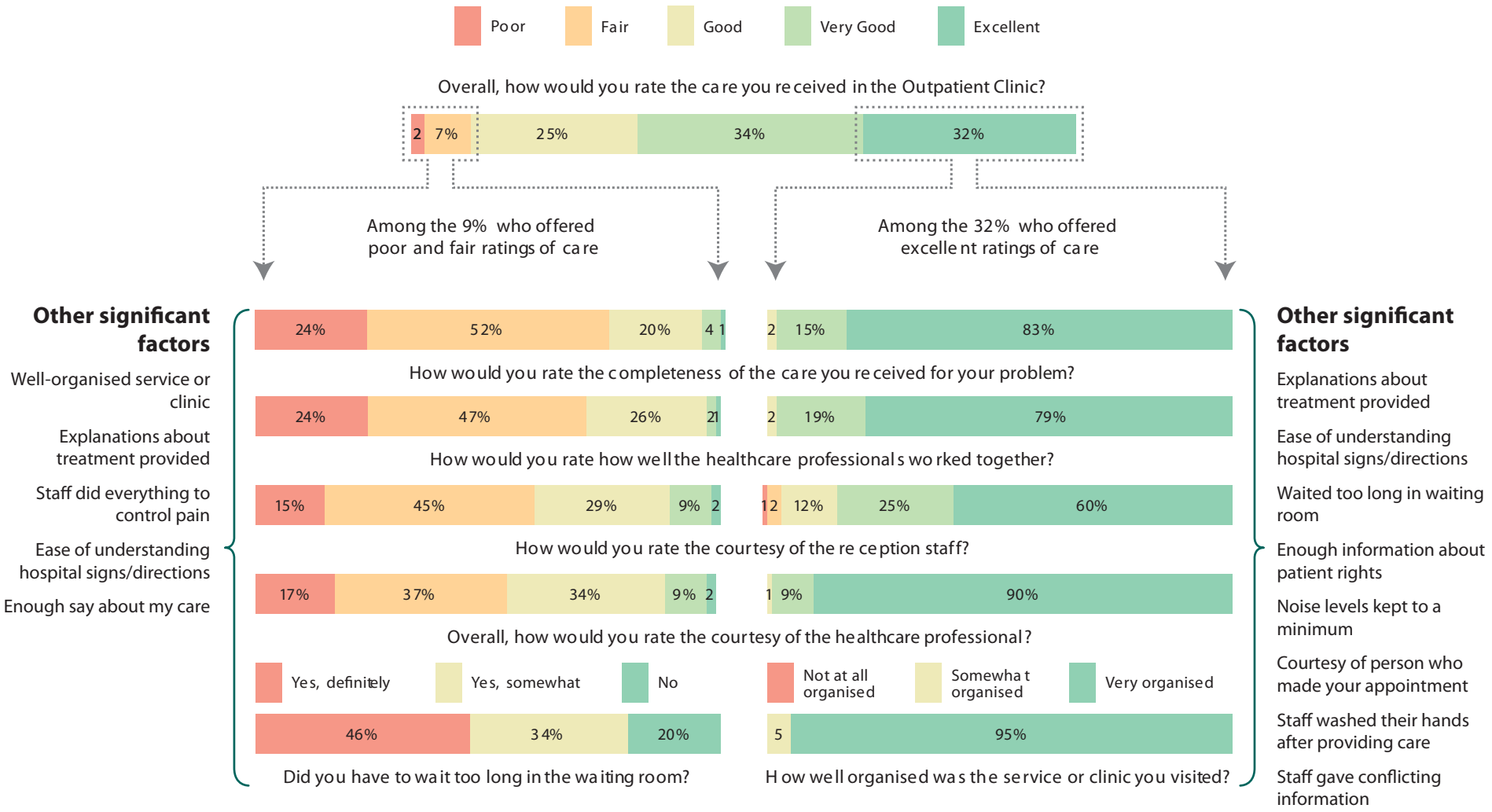
It is notable that of the 32 per cent of respondents who rated their care experience as excellent, 90 per cent rated the courtesy of their health professional as excellent, 83 per cent rated the completeness of the care they received as excellent and 79 per cent rated the teamwork of the healthcare professionals treating them as excellent. Overall, the completeness of care received was the factor that mattered most to patients when rating their outpatient care experience.

Implications: Of the factors measured by *The NSW Health Patient Survey*, the completeness of care and staff teamwork were found to be the most strongly associated with overall ratings of care. That is, if respondents rated completeness of care and teamwork highly, they were more likely to give a high overall rating. The courtesy of hospital staff makes a significant difference to how people rated their outpatient care experience. If the courtesy of health professionals and reception staff was poor, patients were more likely to report a negative overall experience. The findings from *The NSW Health Patient Survey* are important in providing an opportunity to receive feedback from patients on their care and overall experience of treatment and for health services to learn from this and make appropriate changes.

What we don't know: How representative of the total patient population were the subset of those who responded to the survey in demographic terms, and in terms of the outcomes of care?

Care experiences that matter most to outpatients in NSW

Chart 3-3



Note: Care experiences that matter most are based on analysis of all outpatient care respondents to the NSW Health Patient Survey 2010.
Note: All percentages rounded to whole numbers and therefore may not add to 100%.
Source: Outpatient care module of the NSW Health Patient Survey 2010.

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EMERGENCY CARE | Introduction

Chapter 4

The primary role of emergency departments (EDs) is to care for patients with serious injuries or illnesses who require urgent medical attention. In addition, they treat a range of patients who have less urgent need, although priority is given to those requiring critical medical treatment.

'Triage' is the process of assessing the clinical urgency of a person presenting to the ED. Patients are assigned one of five categories (1-5) by a triage nurse. Those assigned the higher categories of 1 and 2 are given priority. For each category, the Australasian College for Emergency Medicine (ACEM) has established a maximum time that patients should wait to be seen by a nurse or doctor for treatment. The Bureau of Health Information (BHI) now publishes data on the performance of emergency departments. The Emergency Care Institute (ECI) a key network in the Agency for Clinical Innovation (ACI) will use data from both BHI and CEC to improve outcomes for patients in emergency departments (ED) across NSW. All these organizations are collaborating to construct a program of integrated and complementary reports for quality improvement in patient safety.

In 2009-10, there were 2,442,982 ED visits in NSW public hospitals (NSWDOH, 2011). Hospitals that participate in the National Non-admitted Patient Emergency Department Care Database account for 80 per cent of total ED visits (AIHW, 2010e).

In terms of urgency of presentation:

- 0.6 per cent of patients were assigned to triage category 1 (immediately life-threatening – formerly resuscitation)
- 8.3 per cent to category 2 (imminently life-threatening – formerly emergency)
- 30.2 per cent to category 3 (potentially life-threatening – formerly urgent)
- 45.0 per cent to category 4 (potentially serious – formerly semi-urgent)
- 15.7 per cent to category 5 (less urgent or non-urgent) (AIHW, 2010e)

In 2009-10, 26.5 per cent of ED visits resulted in hospital admission.

The NSW Ministry of Health has implemented several initiatives to achieve improved performance in EDs. They include:

- The Clinical Services Redesign Program (CSRP), through which clinical service systems, including EDs, are redesigned to improve patient journeys across multiple care settings in local health districts
- Fast-track zones, which ensure that patients with minor illnesses and injury, who have traditionally waited for long periods, are streamed from triage to a designated area for treatment
- Emergency medicine units (EMUs), where a patient who needs a longer period of care or observation can stay. This allows the ED to create capacity, by expediting the flow of patients and avoids an in-patient admission to a hospital bed for those who can appropriately be referred to acute community care, following a period of observation
- Medical assessment units (MAUs), which provide rapid access to physicians and multi-disciplinary care teams for patients with complex, chronic and non-critical conditions. MAUs assess patients and activate treatment, seeking to discharge patients to supported community care within 48 hours. MAUs also provide care for patients referred by general practitioners (GPs) for non-critical care assessment and undertake post-discharge assessment and review
- Specialised chest pain evaluation areas and cardiology bed management strategies.

Why is this important? In 2009-10, there were 2,442,982 visits to hospital emergency departments (EDs) recorded across NSW (NSWDOH, 2011a). Improving the quality of emergency care, in particular reducing waiting times in EDs, is a health policy priority (NSWDPC, 2011). Excessive waits in the ED can impact negatively upon clinical outcomes, patient satisfaction and resource use.

The Australasian College for Emergency Medicine's (ACEMs) National Triage Scale, (ACEM, 2000), defines five time periods by which patients presenting to the ED should receive care, based on an assessment of urgency, known as "triaging".

ACEM Cat	ACEM Australasian Triage Scale (ATS) descriptor	Previous ATS descriptor	Threshold (minutes)	Target (%)
1	immediately life-threatening	resuscitation	immediate	100
2	imminently life-threatening	emergency	within 10	80
3	potentially life-threatening	urgent	within 30	75
4	potentially serious	semi-urgent	within 60	70
5	less urgent or non-urgent	non-urgent	within 120	70

Findings: In 2010, emergency department performance benchmarks were achieved Statewide for all triage categories except 3 (potentially life-threatening). All category 1 (immediately life-threatening) patients were treated immediately in all local health districts (LHDs). For category 2 patients, the target of 80 per cent of patients to be seen within 10 minutes was met in all LHDs except Southern NSW (60 per cent), Mid North Coast (63 per cent), Central Coast (69 per cent), Western NSW (69 per cent) and Northern NSW (74 per cent). In three of these, (Mid North Coast, Southern NSW and Northern NSW), performance in meeting this triage target decreased significantly in 2010 compared to 2008. Four LHDs in 2010 achieved the 75 per cent benchmark for triage category 3 patients treated within 30 minutes. This represents a significant improvement over 2004, when Statewide, only 59 per cent of patients were seen within 30 minutes and only one area health service (Greater Southern) achieved the benchmark. For patients in category 4 (potentially serious), the percentage seen within the benchmark time of one hour in 2010 was 73 per cent. The majority of LHDs achieved the 70 per cent benchmark, with the exception of Central Coast, Western Sydney, Sydney Children's Hospitals and Mid North Coast. For patients in triage category 5 (less urgent or non-urgent), all LHDs achieved the benchmark of 70 per cent of patients receiving care within two hours. Statewide, the average was 88 per cent.

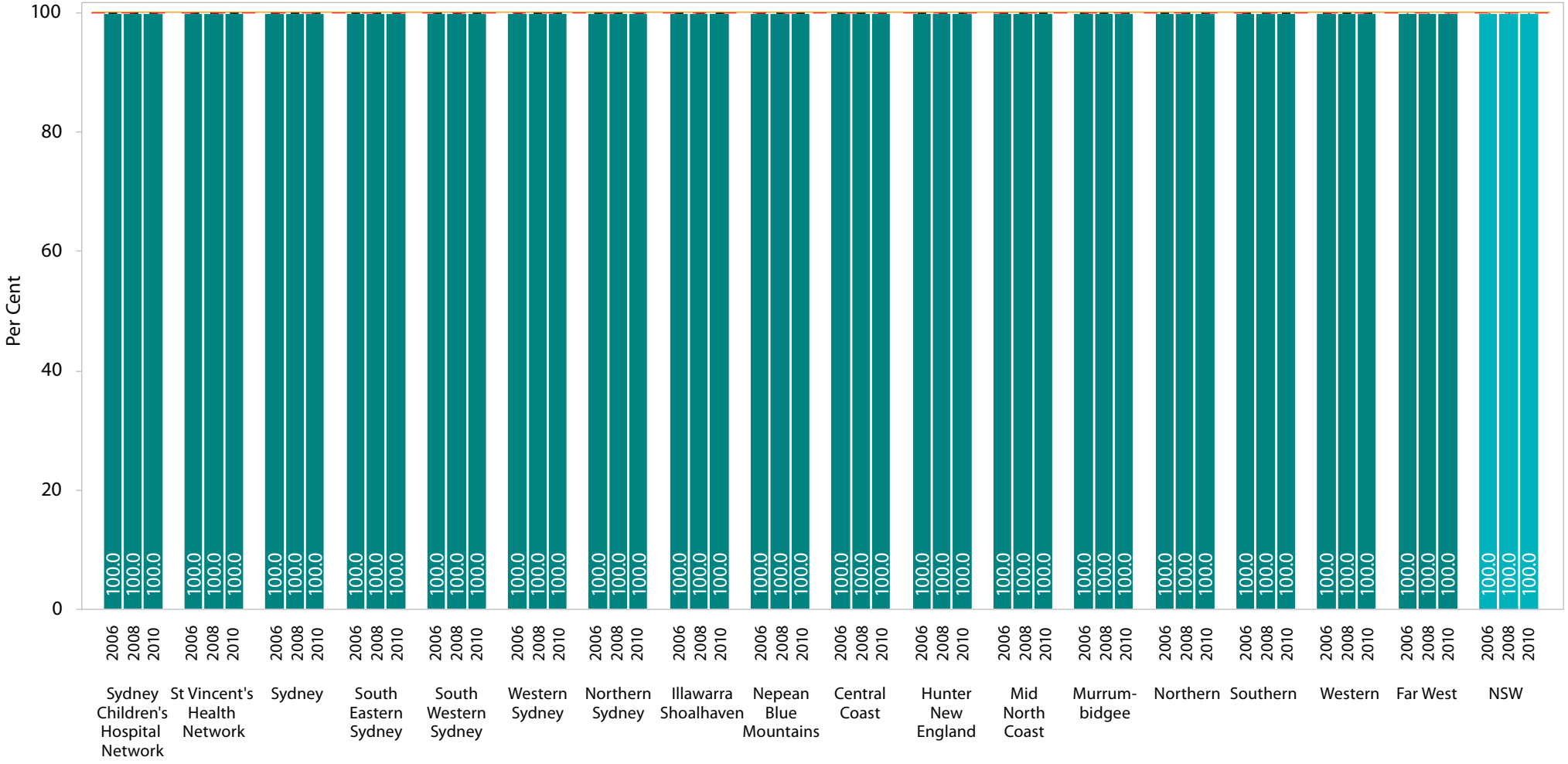
Implications: NSW Health, in partnership with EDs, has implemented strategies to improve performance, including triage times (NSWDOH, 2006b). Initiatives include fast-track zones (patients identified as ambulatory and non-complex are streamed separately from other patients and treated in accordance with standard protocols), the 3-2-1 process* and medical assessment units. Strategies outside EDs have also been implemented, including performance management and additional beds. Improvements in triage performance indicate that these initiatives have been effective.

***Note** "The 3-2-1 process breaks down a patient's journey through the ED into manageable 'chunks' of time. It works by identifying measurable time points for each part of the journey and uses pre-agreed protocols and policies to expedite admission or discharge. The underlying principle governing 3-2-1 is that patients should only stay in the ED for the minimum amount of time required to safely assess, stabilise and transfer care to the inpatient environment or discharge home safely" (NSWDOH, 2006b).

Emergency department waiting times

Chart 4-1

Percentage of emergency department patients allocated to triage category 1 (Immediately life-threatening) treated immediately by local health district of residence, 2006-2010

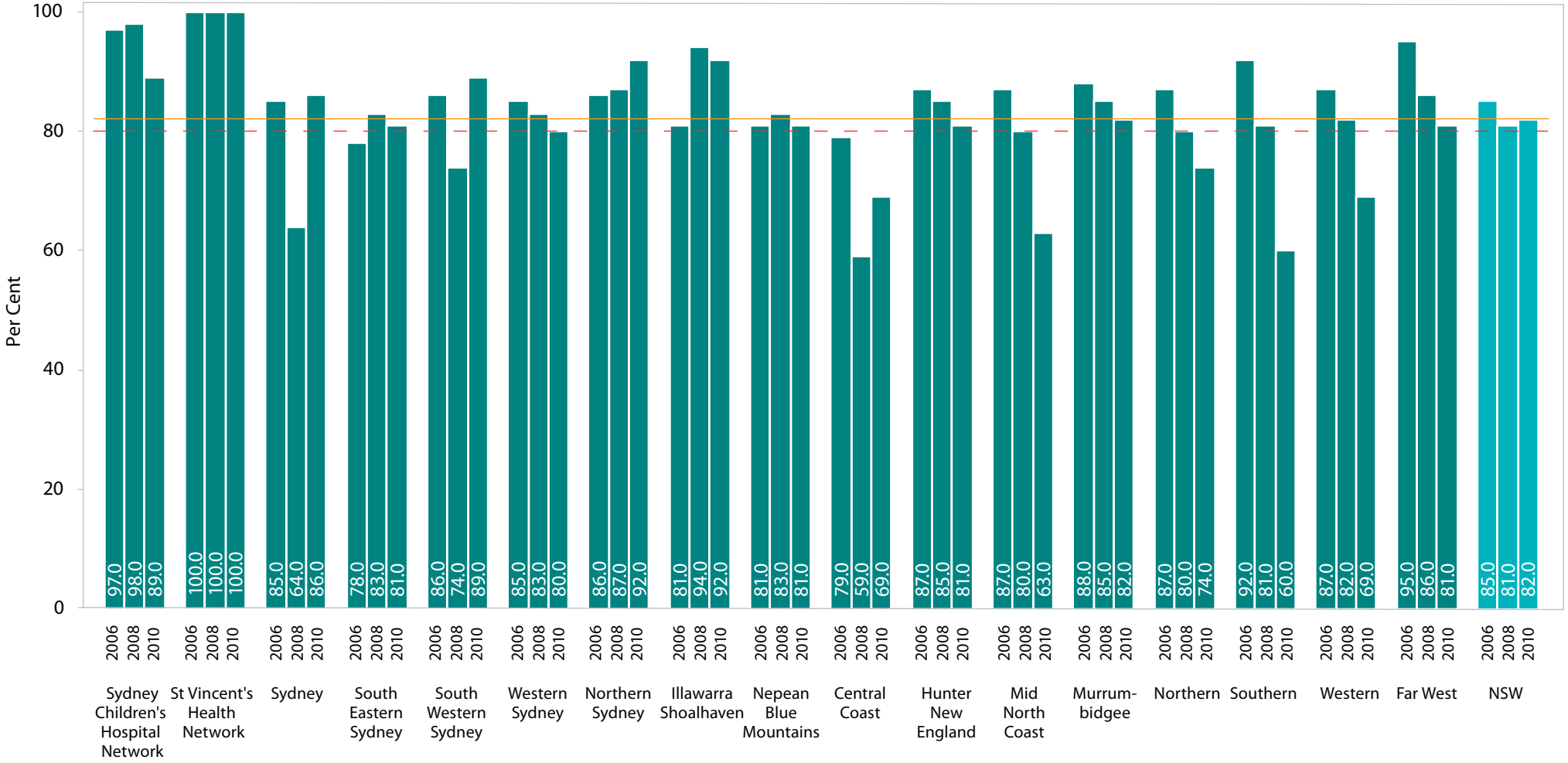


Source: NSW Emergency Department Data Collection, Demand and Performance Evaluation Branch, NSW Health System Performance, NSW Ministry of Health.

Emergency department waiting times

Chart 4-2

Percentage of emergency department patients allocated to triage category 2 (Imminently life-threatening) treated within 10 minutes by local health district of residence, 2006-2010

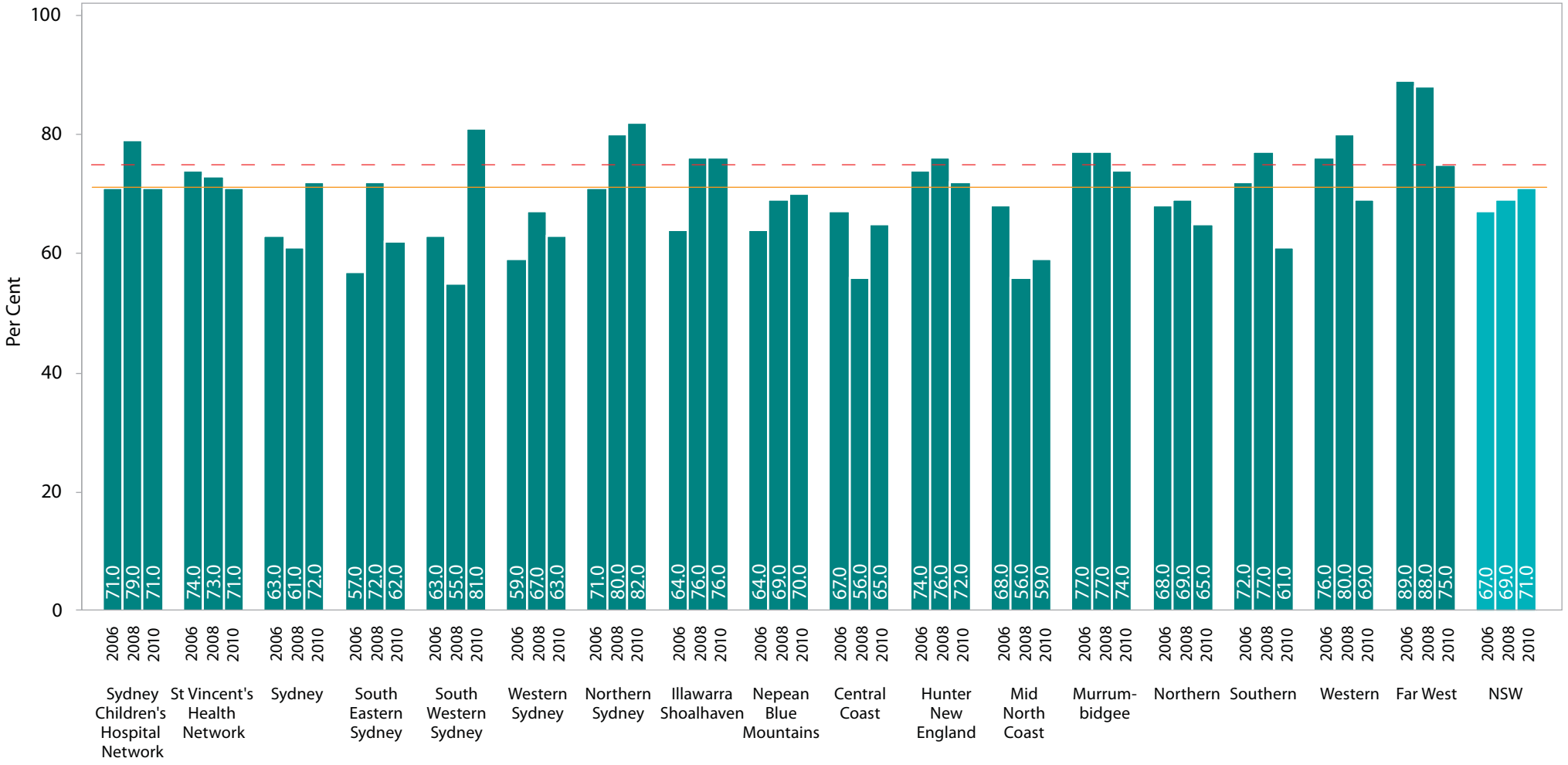


Source: NSW Emergency Department Data Collection, Demand and Performance Evaluation Branch, NSW Health System Performance, NSW Ministry of Health.

Emergency department waiting times

Chart 4-3

Percentage of emergency department patients allocated to triage category 3 (Potentially life-threatening) treated within 30 minutes by local health district of residence, 2006-2010

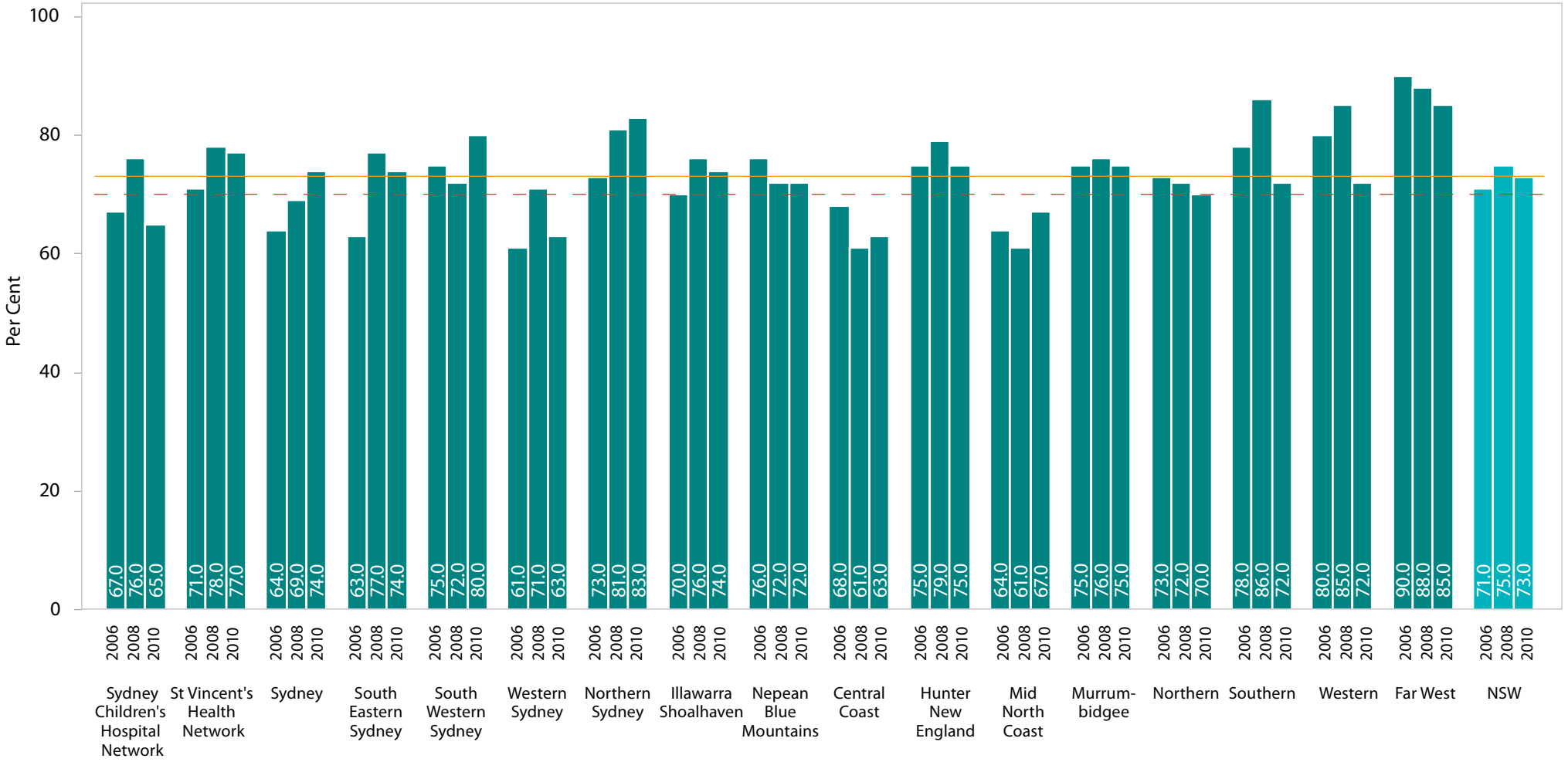


Source: NSW Emergency Department Data Collection, Demand and Performance Evaluation Branch, NSW Health System Performance, NSW Ministry of Health.

Emergency department waiting times

Chart 4-4

Percentage of emergency department patients allocated to triage category 4 (Potentially serious) treated within 60 minutes by local health district of residence, 2006-2010

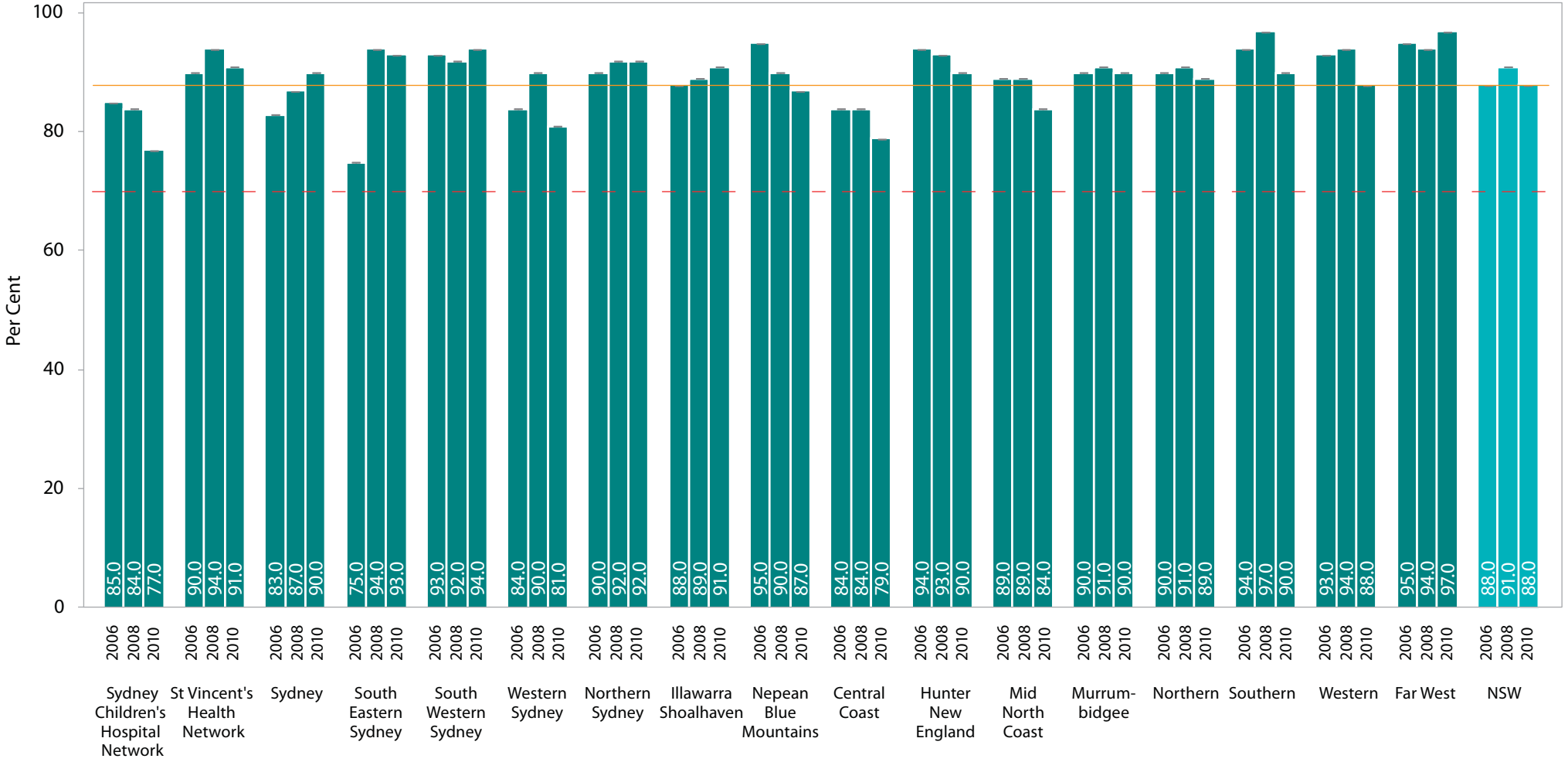


Source: NSW Emergency Department Data Collection, Demand and Performance Evaluation Branch, NSW Health System Performance, NSW Ministry of Health.

Emergency department waiting times

Chart 4-5

Percentage of emergency department patients allocated to triage category 5 (less-urgent) treated within 120 minutes by local health district of residence, 2006-2010



Source: NSW Emergency Department Data Collection, Demand and Performance Evaluation Branch, NSW Health System Performance, NSW Ministry of Health.

Why is this important? Over recent years there has been considerable concern expressed about 'access block' – a term which refers to extended delays in admitting patients from the emergency department (ED) (ACEM, 2004). NSW Health has stated that the wait between the start of active treatment and admission to a hospital ward should be no more than eight hours, and has set a target that 80 per cent of patients should be admitted within that timeframe. Importantly, inpatient bed capacity is essential for the effective management of emergency admissions. Modelling indicates that, as hospital bed occupancy increases, the likelihood of having no bed available for an emergency admission increases (Bagust, Place, & Posnett, 1999). In particular, this modelling indicated that bed crises are more likely to occur when hospital bed occupancy exceeds 85 per cent. Work in the Australian Capital Territory indicates that patients who are not transferred from the ED to a ward within eight hours of the start of active treatment stay longer in hospital than those who are transferred within eight hours (Richardson, 2002). Inability to admit patients in a timely manner leads to ED overcrowding. Hospital and ED overcrowding can increase mortality among emergency admissions (Sprivulis, Da Silva, Jacobs, Frazer, & Jelinek, 2006).

Findings: In 2010, 65 per cent of emergency patients requiring inpatient admission in NSW were admitted within eight hours, below the performance target of 80 per cent. Across local health districts, performance ranged from 60 per cent in Central Coast to 89 per cent in Southern NSW.

Implications: The Clinical Services Redesign Program (CSRP), implemented by the Ministry of Health (MOH), has focused on improving patient journeys across multiple care settings, including EDs, in local health districts. According to the MOH, future efforts will be focused on expanding out-of-hospital care and introducing advanced-care paramedics to treat people in their own homes. Effort will also be made to provide alternative referral pathways to ensure that patients are treated in the most appropriate location. Other initiatives include:

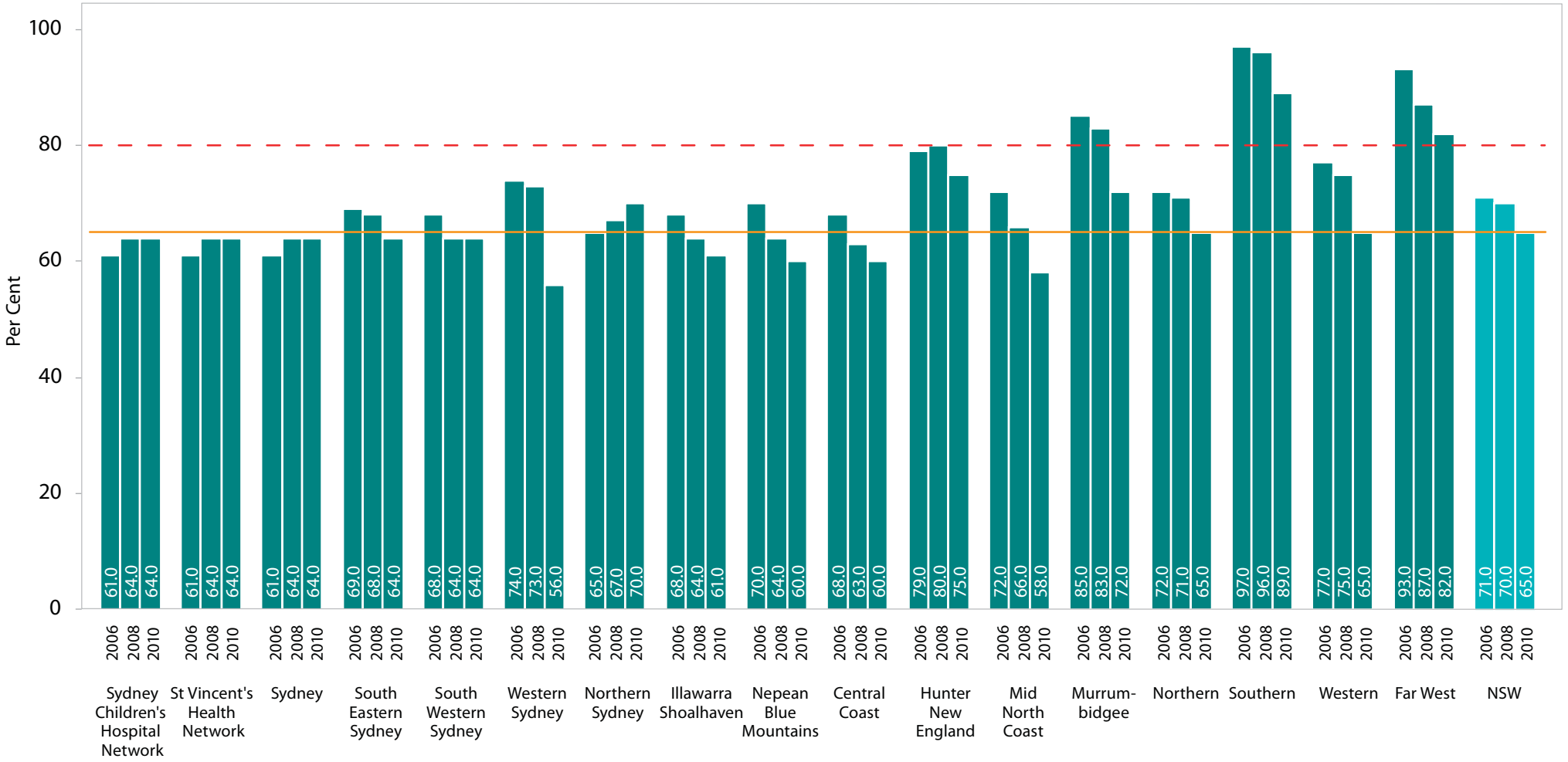
- An increase in clinical initiative nurses across NSW major emergency departments has been implemented (COAG, 2011; Garling, 2008; NSWDOH, 2009a), this role provides senior clinical staff in the waiting room to assess and initiate treatment. It facilitates open communication between the patients and carers in the waiting room.
- Short-stay units, such as medical assessment units (MAUs) which provide rapid access to physicians and multi-disciplinary teams for patients with complex, chronic and non-critical conditions, emergency medical units (EMUs) and short-stay observation units.
- The patient flow system, which is a whole-of-hospital approach to manage patient journeys through the healthcare system.

Locally, the development of policies involving the ED and specialist medical staff, seeks to ensure that there are no delays in patients moving to inpatient wards, following treatment and stabilisation in the EDs.

Emergency admission performance

Chart 4-6

Emergency department patients requiring admission: Percentage admitted to general ward, intensive care unit, operating theatre within eight hours of active treatment by local health district of residence, 2006-2010



Source: NSW Emergency Department Data Collection, Demand and Performance Evaluation Branch, NSW Health System Performance, NSW Ministry of Health.
Notes: Excluding Albury Hospital; Admissions include admission as inpatient, discharge from ED and death.

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CIRCULATORY DISEASE | Introduction

Chapter 5

The circulatory system consists of the heart and blood vessels which move blood and lymph around the body. Diseases of the circulatory system include coronary heart disease (also known as ischaemic heart disease) and stroke. Despite steady improvement over the last four decades, circulatory disease remains the leading cause of death in Australia and continues to generate a considerable burden on the population in terms of illness and disability. In relation to direct healthcare expenditure, circulatory disease is the most expensive health condition, costing an estimated 11 per cent of total allocated health system expenditure (AIHW, 2009). In 2004-05, 18 per cent (approximately 3.5 million) of Australians reported having a long-term cardiovascular condition. In 2007-08, 16 per cent of the population reported one or more long-term conditions of the circulatory system (ABS, 2009).

There are a number of risk factors which increase the likelihood of developing circulatory disease. Some are modifiable, such as smoking, eating a healthy diet, weight control and participating in exercise and physical activity. Other risk factors are inherited and are not modifiable, such as increasing age and a family history of circulatory disease.

Cardiovascular disease was the most common cause of death in NSW in 2007, accounting for 35.1 per cent of all deaths (CER, 2011). Included in these 16,260 deaths were 7,818 (48%) due to coronary heart disease and 4,135 (25.4%) due to stroke. The burden of circulatory disease is not distributed equally across the population. Mortality rates are higher in males than females (245 and 175 per 100,000 respectively). Further, people from lower socio-economic backgrounds and Aboriginal and Torres Strait Islander people have higher mortality. This chapter focuses on coronary heart disease (CHD).

Coronary heart disease is a narrowing of the blood vessels that supply blood and oxygen to the heart. It is caused by a combination of atherosclerosis (the collection of fatty substances, such as cholesterol, that form 'plaques' along the lining of the coronary arteries) and blood clots. If the blood supply to the heart is reduced, this will cause chest pain (also known as angina) and if the blood supply to part of the heart is completely blocked, a heart attack or acute myocardial infarction (AMI) will occur. CHD is a preventable disease. Death rates continue to decline, with a 42 per cent decrease in the last decade alone Australia-wide (AIHW, 2008b). This decline is due to both a reduction in heart attacks and better survival rates. CHD was the principal reason for just over 50,000 hospitalisations in NSW in 2009-10 (CER, 2011).

Why is this important? Acute myocardial infarction (AMI) or heart attack occurs when there is a sudden blockage of a coronary artery, resulting in death of the heart muscle. Different parts of the heart are damaged at the time of a heart attack, depending on which coronary artery is affected and where the blockage occurs. If there is a complete blockage of one of the coronary arteries, the heart muscle is irreversibly damaged and this is known as a ST elevation myocardial infarction (STEMI). A partial blockage of a coronary artery results in less damage to the heart muscle and this is known as a non-ST elevation myocardial infarction (NSTEMI). Each year approximately 18,000 people are admitted into NSW hospitals with an AMI. The rate of AMI events and death from these events has declined over the past decade (AIHW, 2010). In 2006, AMI was responsible for 4,259 deaths in NSW (NSWDOH, 2010). The aim of improving care for people with AMI is to significantly increase the likelihood of survival and considerably reduce the chance of further events. Best practice in the treatment of patients with STEMI who present within 12 hours of the onset of ischaemic symptoms is prompt reperfusion by primary angioplasty or, where unavailable, initiation of thrombolysis (Aroney *et al*., 2008). After a patient has had an AMI, there are several types of medication that reduce the risk of another AMI and heart failure. These treatments, known as secondary prevention, include:

- Aspirin alone, or in combination with clopidogrel, which helps to prevent the blood from clotting
- Beta-blockers, which slow the heart rate and lower blood pressure
- Angiotensin-converting enzyme inhibitors (ACE-I), which block an enzyme in the blood that causes blood vessels to contract, thereby relaxing blood vessels and lowering blood pressure
- Statins, which reduce both the total cholesterol and low-density lipoprotein (LDL or 'bad') cholesterol levels in the blood, reducing the relative risk of coronary events.

All patients should be referred to cardiac rehabilitation and secondary prevention programs and be provided with advice on lifestyle changes that will reduce the risk of further coronary heart disease.

Findings: Between 2007 and 2009, the rate of admissions due to AMI decreased significantly from 246 to 221 per 100,000 population. Across local health districts in 2009, admission rates ranged from 156 per 100,000 population in Northern Sydney, to over twice that rate in Western NSW, (342 per 100,000 population). Patterns of AMI hospitalisation are strongly correlated with socio-economic status, rurality and indigenous status (refer to Chart 12-1, p.147). Admissions rates in the most disadvantaged population quintile are double those in the least disadvantaged quintile (see Chart 5-2). AMI hospitalisation rates are also significantly higher in outer regional, remote and very remote areas compared to major cities.

Implications: This data reflects a new trend in the rate of AMI hospitalisations. In the first half of the past decade, the rate of hospitalisations was increasing steadily each year and peaked in 2007 at 246 per 100,000 population (CEC, 2007, 2010). In 2009, this trend has reversed and the rate appears to be decreasing across all local health districts. Of concern is the higher rate of myocardial infarction in outer metropolitan and rural areas where there are fewer coronary revascularisation facilities. Over the past five years, there has been a major development of public hospital interventional cardiology services in outer regional and rural areas in NSW. This has resulted in a substantial improvement in access to definitive treatment for patients with AMI in major regional centres such as Coffs Harbour, Orange, Tamworth, Wagga Wagga and Gosford (SV&MHS, 2008). The impact of these developments is observable in the 2009 admission rates with significant reduction in AMI admissions for residents of Mid North Coast, Murrumbidgee and Central Coast local health districts.

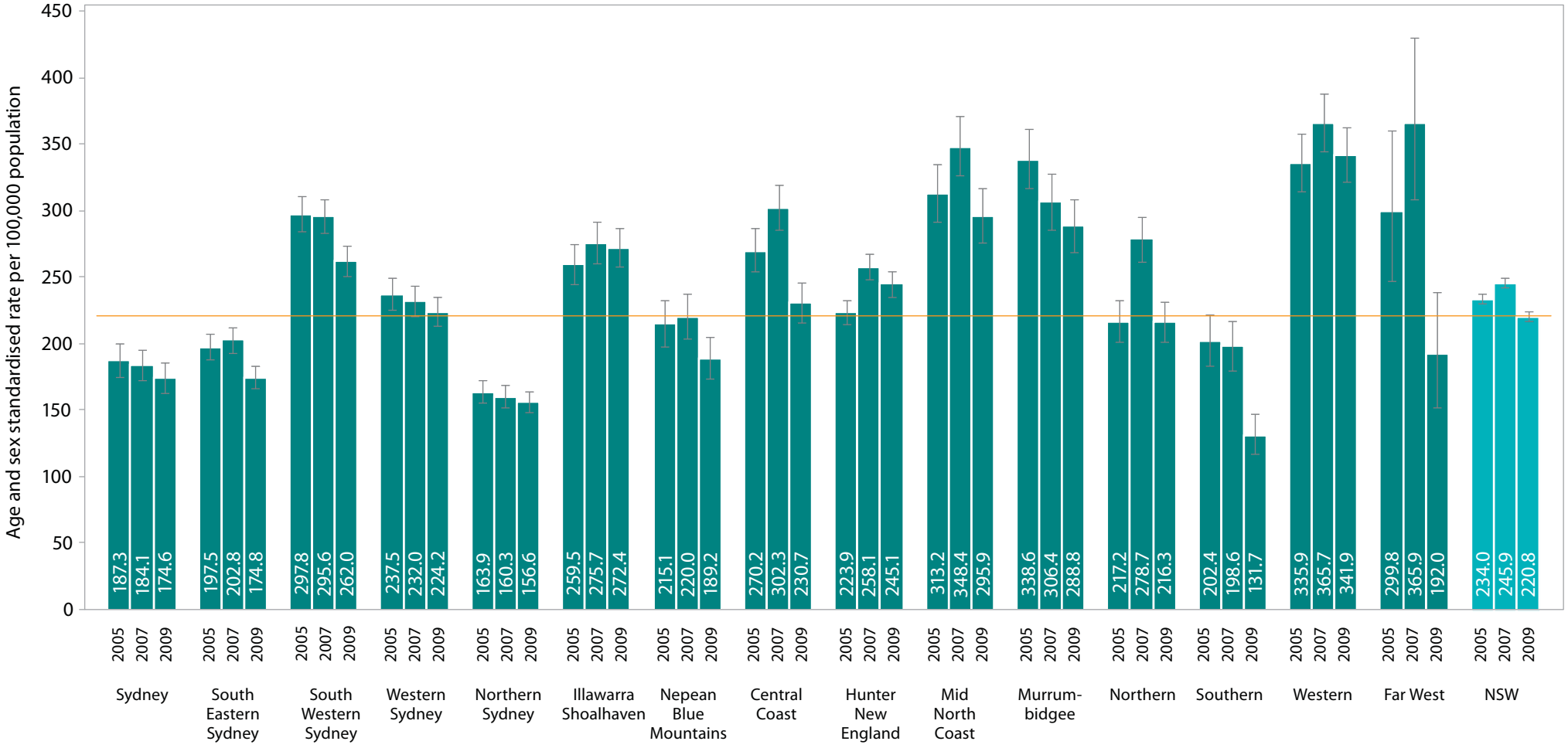
What we don't know: What are the most effective strategies to reduce the differences in heart attack rates between local health districts, particularly between rural and urban LHDs?

Are the AMI hospitalisation counts an accurate reflection of the disease burden in acute coronary disease, given the potential for double counting an admission within a single episode of care following inter-hospital transfers?

Admissions for acute myocardial infarction (AMI)

Chart 5-1

Age and sex standardised rate per 100,000 population for AMI by local health district of residence, 2005-2009

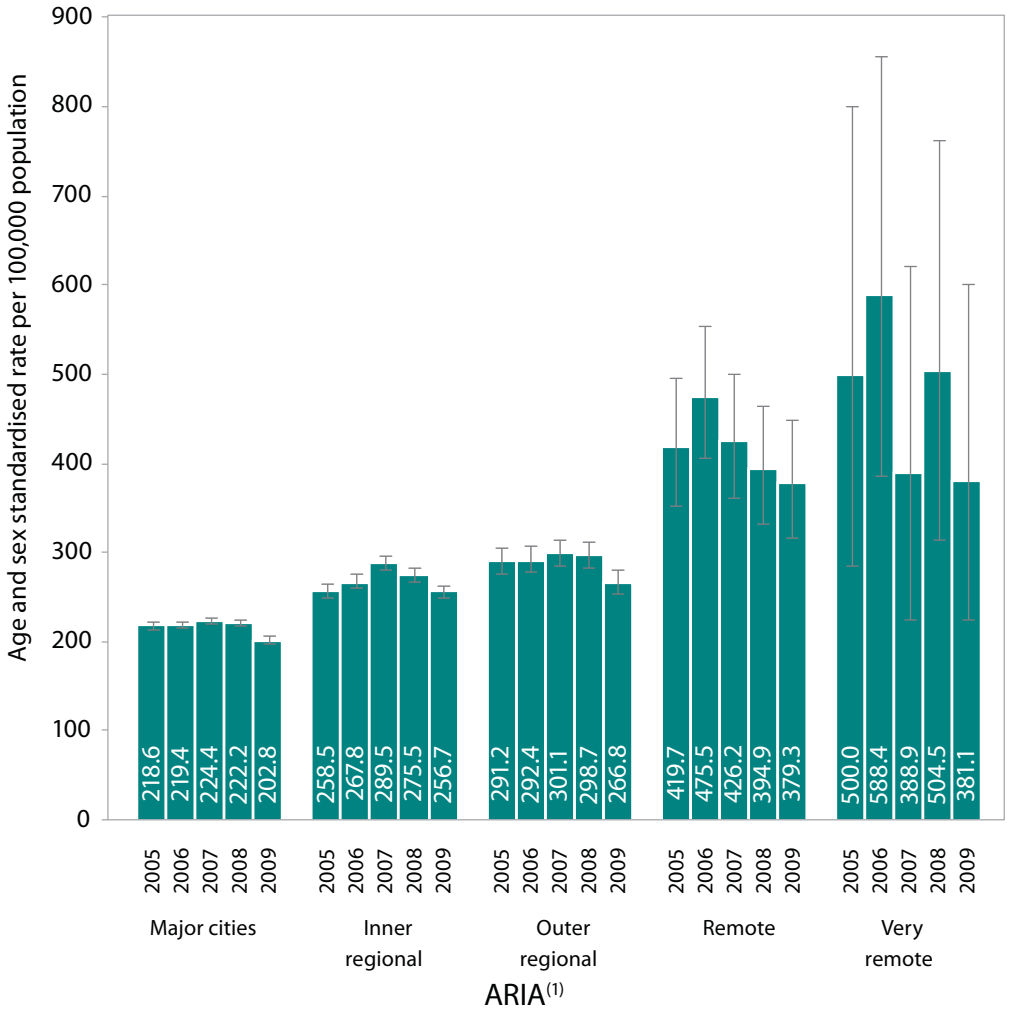


Source: NSW Admitted Patient Data Collection and ABS population estimates (HOIST). Centre for Epidemiology and Research, NSW Ministry of Health.

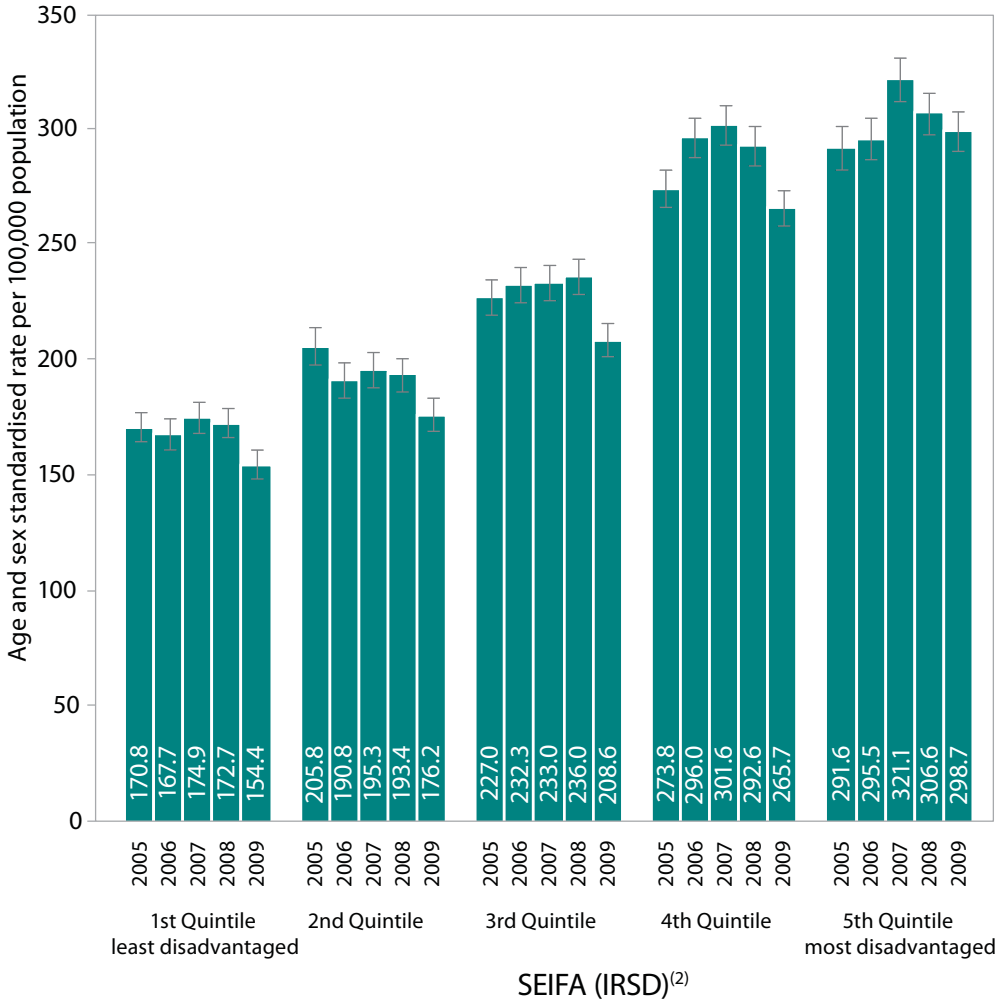
Admissions for acute myocardial infarction (AMI) by ARIA[1] and SEIFA (IRSD)[2]

Chart 5-2

Age and sex standardised rate of admissions for AMI per 100,000 population by remoteness region (ARIA), 2005-2009



Age and sex standardised rate of admissions for AMI per 100,000 population by socio-economic status quintile (Index of relative socio-economic disadvantage), 2005-2009



Source: NSW Admitted Patient Data Collection and ABS population estimates (HOIST), Centre for Epidemiology and Research, NSW Ministry of Health.

(1) Accessibility/Remoteness Index of Australia, ABS 1216.0 (2006).

(2) Socio-economic Indices for Areas (Index of Relative Socio-economic Disadvantage) ABS 2039.0 (2008).

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Why is this important? Coronary heart disease is a major cause of illness and premature death in the NSW community. In its early stages, coronary heart disease may be treated through control of modifiable risk factors such as smoking, high blood pressure and high cholesterol levels. However, the disease may progress to a point where revascularisation is required, either using a percutaneous coronary intervention or a surgical procedure such as a coronary artery by-pass graft (CABG). CABG is a surgical procedure where new channels are created around blocked or narrowed arteries to allow blood to reach the heart muscle again. If a heart valve is too narrow to allow sufficient blood through its opening, or the valve cannot close tightly enough to prevent blood flowing in the wrong direction from the heart, it may be replaced surgically. CABG may be performed in isolation or in combination with valve surgery. The main benefits of CABG are relief of chest pain, prevention of further heart damage and reduced risk of death. As with any operation, the procedure itself carries a risk of death. These risks are related to characteristics of patients, such as the severity of the coronary heart disease, their age and the presence of other conditions that complicate treatment. Characteristics of the relevant hospitals and surgeons, such as the volume of procedures regularly performed, have also been found to impact on patient outcomes. The Australia and New Zealand Society of Cardiac and Thoracic Surgeons (ANZSCTS) has developed a national cardiac surgery data collection that can be used for benchmarking outcomes. NSW public hospitals performing CABG procedures have been contributing data since 2007 (Tran *et al*., 2011). In 2010, the survival rate for patients in NSW public hospitals for isolated CABG, isolated valve surgery and CABG in combination with valve surgery, was 98.5 per cent, 97.4 per cent and 94.9 per cent, respectively (Tran, *et al*., 2011).

Findings: All of the eight public hospitals performing cardiovascular surgery in NSW completed a minimum of 250 procedures per annum in 2010. The number of surgical procedures performed ranged between 255 and 620. CABG provided in isolation, accounted for between 42 to 72 per cent of total procedures in all hospitals.

Implications: Cardiac surgery registers involving the collection of comprehensive data on patients receiving surgery and the outcomes have been established in a number of health systems (e.g. England, New York, Pennsylvania, California and various Canadian provinces) prior to the establishment of the ANZSCTS registry. The development of these data collections has assisted surgeons and hospitals in those jurisdictions to compare patient outcomes and improve safety and quality of care. In some countries, risk-adjusted outcomes for individual hospitals and/or surgeons are released publicly. There is evidence that benchmarking between similar facilities and the public release of results have had a sustained positive impact in reducing mortality rates (Chassin, 2002), although there is debate over the relative contribution of these strategies.

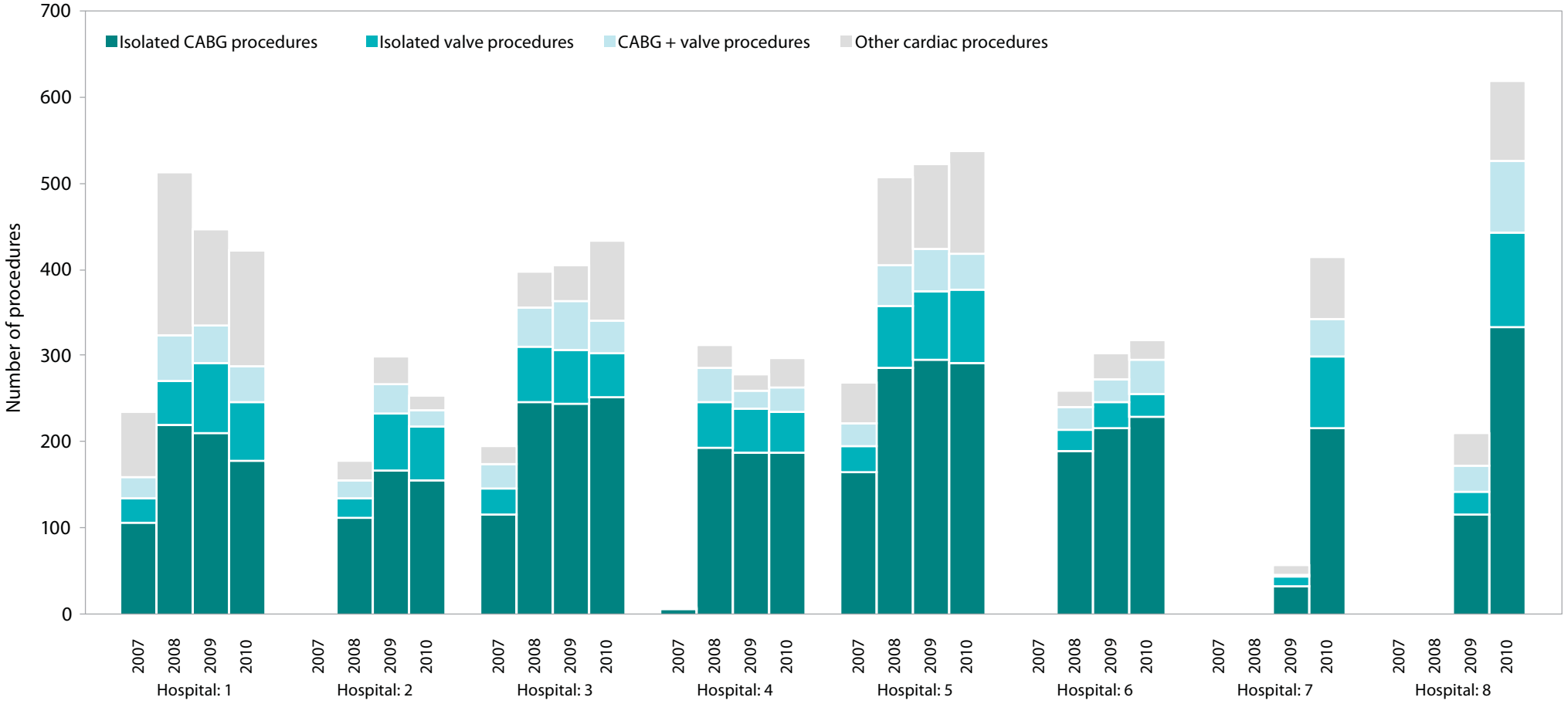
This is the first year that ANZSCTS data has been available for inclusion in Chartbook. In 2012, the Chartbook will include comparative mortality outcome data for cardiovascular procedures in NSW.

What we don't know: What are the relative number of percutaneous coronary interventions carried out each year in NSW and what are the patient outcomes? This information could be used to compare key interventions for managing acute coronary heart disease.

Surgical cardiovascular procedure counts

Chart 5-3

Number of cardiovascular procedures reported by procedure type, participating NSW units and time period, 2007-2010



Source: Australia and New Zealand Society of Cardiothoracic Surgeons (ANZSCTS).
Notes: 2007 contains only 6 month's worth of data. Excludes procedures such as percutaneous coronory interventions.

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ORTHOPAEDIC CARE | Introduction

Chapter 6

Orthopaedic hospital services are often required following admission for an injury, but may also be necessary because of the progression of chronic and disabling conditions such as arthritis. Arthritis is characterised by inflammation of the joints, which causes pain, stiffness and disability. It is caused by a range of factors, which include previous injuries, infection, auto-immune diseases, genetics and excess body weight. Some types of arthritis, such as osteoarthritis, are more prevalent as people get older. Other musculoskeletal conditions, such as osteoporosis and back pain, affect the bones and muscles and their attachments to each other.

This chapter presents data on two important areas of orthopaedic care: hip and knee replacement for patients aged 65 years and over.

In terms of deaths within 30 days of hip and knee replacements, data for NSW indicates rates in line with international experience. In 2008, 0.4 per cent of patients aged 65 and over, who underwent a hip replacement, died within 30 days of the procedure. For knee replacements, the figure was 0.1 per cent.

In 2005–06, orthopaedic surgery accounted for approximately 22 per cent of surgery patients and 27 per cent of the total days spent in hospital by those undergoing all types of surgery. In 2009, 24,307 knee and hip replacements were performed in NSW hospitals, of which 11,618 were provided for people aged 65 years and over (AIHW, 2011a).

Prevention of hip fractures requires a combination of strategies to improve bone quality and physical ability, by improving strength and mobility. Prevention of knee joint deterioration includes maintenance of a healthy weight and lower limb strength.

Significant advances in surgical treatment have provided effective options to reduce the pain and disability associated with musculoskeletal conditions. Joint-replacement surgery is a cost-effective intervention for severe osteoarthritis, reducing pain and disability and providing restoration of function (Bachmeier *et al*., 2001). Four of the indicators presented in this chapter relate to these procedures.

Rehabilitation should begin as early as possible after hip replacement for trauma, because there is a high risk of loss of mobility for elderly people.

The NSW Agency for Clinical Innovation (ACI) includes arthritis and other musculoskeletal conditions in the range of chronic conditions for which special interventions are being developed. Current focus is on prevention of osteoporotic refractures, early diagnosis and management of arthritis in childhood, supporting improved patient experiences for those requiring elective joint replacement, including improved preventative care and non-surgical treatment of osteoarthritis. The aim of all this work is improved and equitable access, along with earlier diagnosis and evidence-based interventions. See the ACI Musculoskeletal Network website for further Information.

Why is this important? Arthritis and other musculoskeletal conditions are highly prevalent and place a significant burden on the community. Estimated to be responsible for about four per cent of the overall disease burden in Australia (Begg *et al*., 2007), they were declared a national health priority in 2002.

The health impact of arthritis and musculoskeletal conditions can be reduced through early prevention and appropriate management. Joint replacement (arthroplasty) is a cost-effective intervention for osteoarthritis, capable of restoring people to near normal function (AIHW, 2008b). Joint replacements relieve pain, restore mobility and improve quality of life.

Arthritis and musculoskeletal conditions accounted for $4.0 billion (7.5 per cent) of direct health system expenditure in 2004-05 (AIHW, 2008c).

In 2009-10, across all ages, there were 33,930 hip replacements performed in Australia, a rate of around 140 per 100,000 people (AIHW, 2011a). Hip replacement procedures have increased between five and 10 per cent each year for the past 10 years. With an ageing population, the rate of increase is expected to continue. Hip replacements are more common among older people and among females (AOA, 2011). Primary hip replacements may need to be revised if the artificial joint can no longer provide suitable function or causes pain-related disability. In 2007-08, there were 16 total hip revisions per 100,000 population in Australia. In NSW, the rate was 14 (AIHW, 2009b).

Findings: The data presented here shows the age and sex standardised rate of hip replacements performed per 100,000 population aged 65 and over in NSW hospitals, by local health district of usual residence. In 2009, a total of 10,588 hip replacement procedures were performed in NSW, of which 4,558 were provided for people aged 65 years and over. The age- and sex-standardised rate was 468 procedures per 100,000 population aged 65 and over. This represents a 10 per cent increase over the 2005 rate of 455. In 2009, there were significantly different rates between local health districts, ranging from 141 per 100,000 in Far West to 612 in Northern Sydney.

The age and sex standardised rate per 100,000 was highest in inner regional and very remote areas and lowest in major cities and remote areas. Across socio-economic groups, the age and sex standardised rate per 100,000 population aged 65 and over, was highest in the least disadvantaged quintile (569 per 100,000) and lowest in the most disadvantaged quintile (377) (CER, 2011c). The rate of planned hip replacement procedures across NSW has fluctuated; increasing slightly from 421 in 2005 to 426 per 100,000 in 2009.

Implications: Osteoarthritis is the main causative factor for hip replacements. Far less frequently, falls resulting in hip fractures in patients with osteoporosis (or brittle bones) are the underlying reasons for hip replacements. Only about four per cent of hospital separations for hip fractures had osteoporosis identified as a co-morbidity in NSW in 2006-07 (down from eight per cent in 2004-05) (NSWDOH, 2009b).

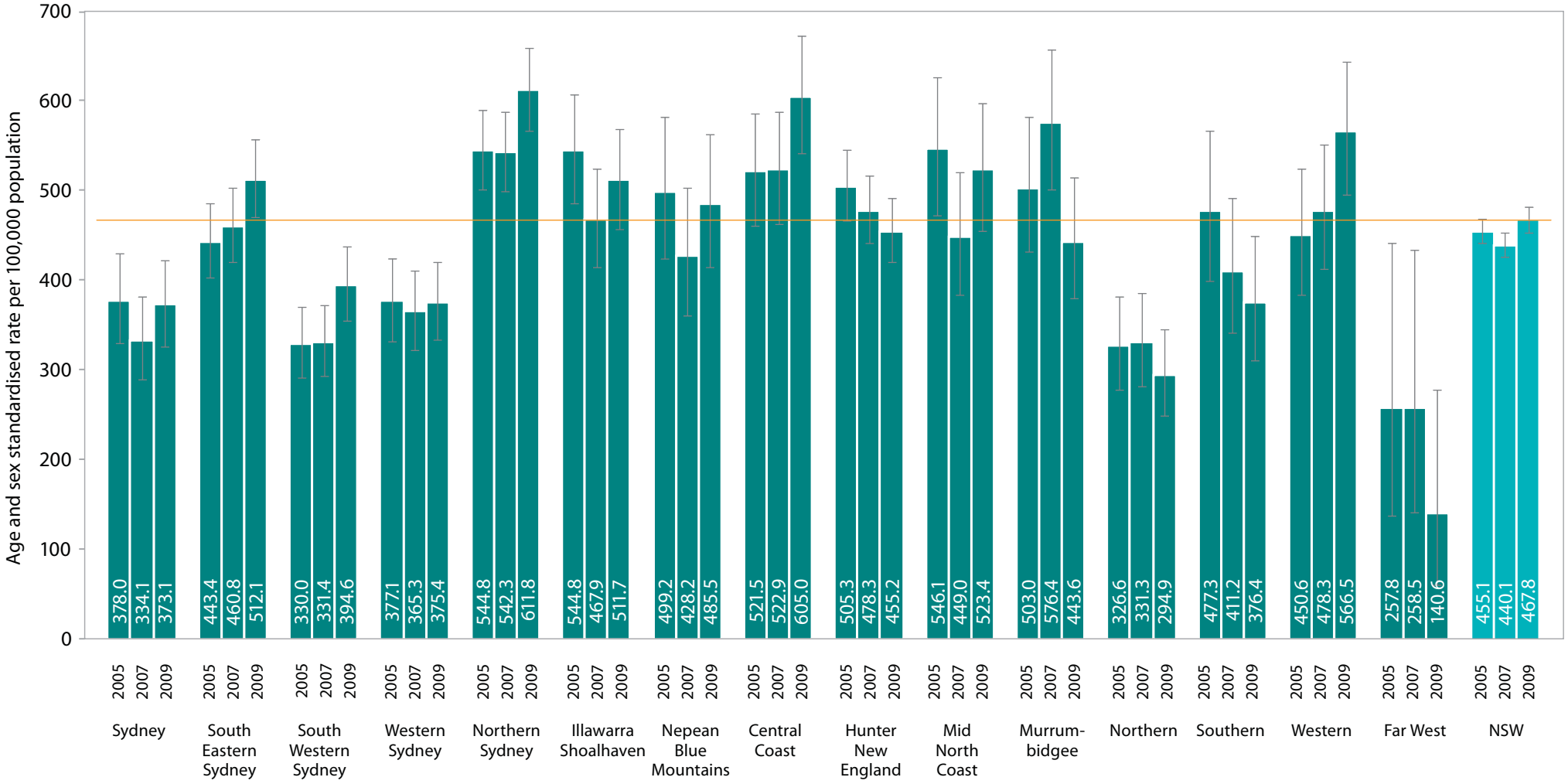
Historically, hip replacement surgery was primarily used for people over 60 years of age. Improved technology has improved the artificial parts, allowing them to withstand more stress and strain. This improved longevity has resulted in increasing numbers of younger patients having hip replacements. This will have a significant implication for future hip replacement rates.

What we don't know: What is the relative impact of the key factors influencing the increased rate of hip replacements, i.e., underlying disease, changing community expectations, rate of revisions and improvements in prostheses?

Provision of hip replacement procedures

Chart 6-1

Hip replacement rate for people aged 65 and over, per 100,000 population by local health district of usual residence, 2005-2009

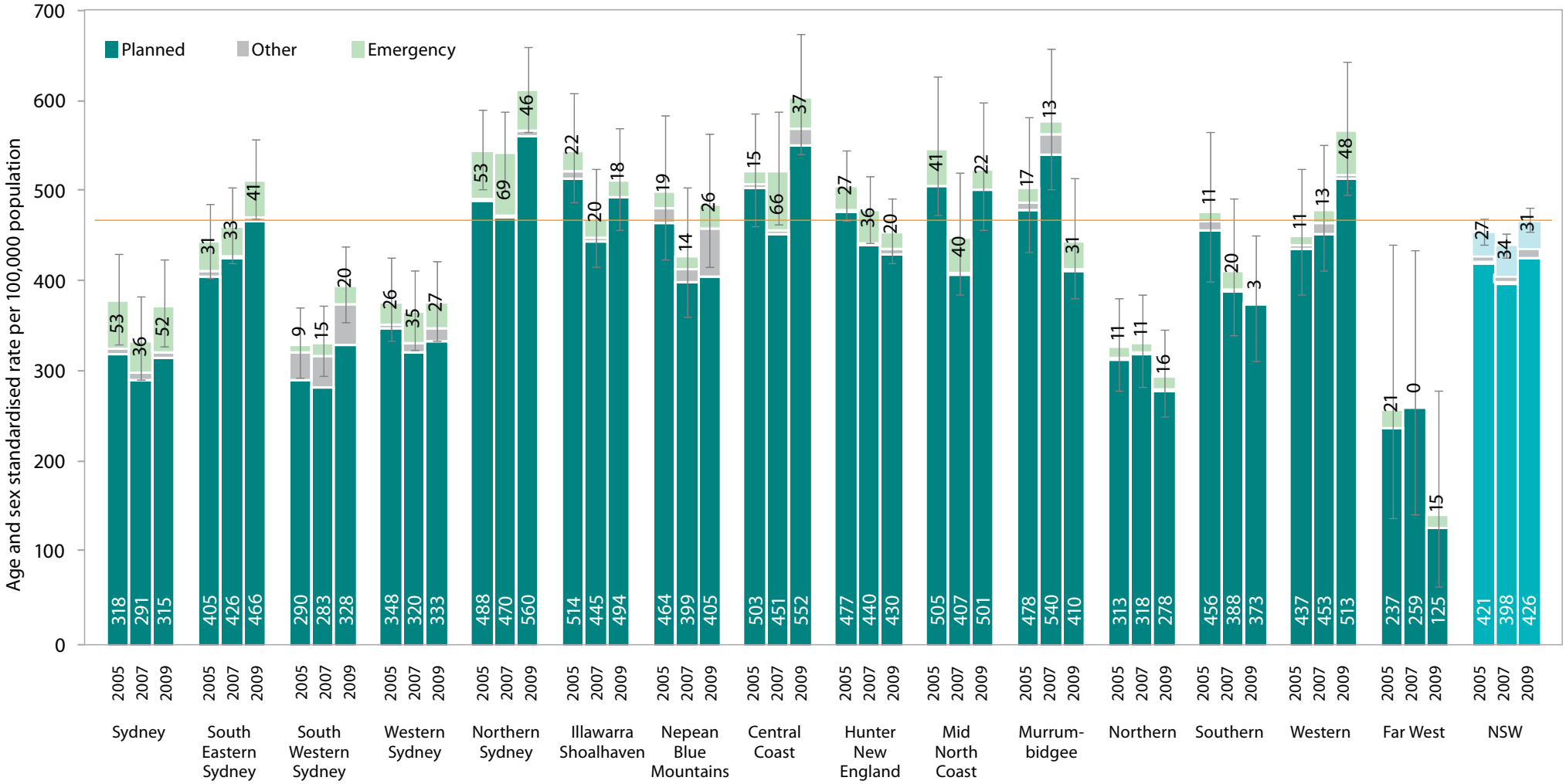


Source: NSW Admitted Patient Data Collection and ABS population estimates (HOIST), Centre for Epidemiology and Research, NSW Ministry of Health.

Provision of hip replacement procedures (planned/emergency)

Chart 6-2

Planned and emergency hip replacement rate for people aged 65 and over, per 100,000 population by local health district of usual residence, 2005-2009



Source: NSW Admitted Patient Data Collection and ABS population estimates (HOIST), Centre for Epidemiology and Research, NSW Ministry of Health

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Why is this important? Knee replacement procedures improve functional status, relieve pain and result in relatively low perioperative mortality (AE, 2007). The indication for almost all primary knee replacement procedures is osteoarthritis. This is true for all four categories of procedure: unispacer, patellar/trochlear, unicompartment and total. Osteoarthritis affects half of all people aged 75 years and over (Grainger & Cicuttini, 2004). The rate of knee replacement surgery in Australia is comparable in international terms, at 159 per 100,000 people in 2007–08 (36,076 separations) (AIHW, 2009b). The prevalence of arthritis is increasing with the ageing of the population. The rate of knee replacements is projected to continue to increase.

Over the last 10 years, the number of knee replacements undertaken annually has increased by 138.4 per cent Australia-wide (AIHW, 2009b). This difference is not just a result of ageing. It also reflects growing rates of obesity and prevalence of osteoarthritis. Increasing numbers of younger patients are receiving knee replacement surgery. Primary knee replacements may need to be revised if the artificial joint can no longer provide suitable function. The principal cause for revision knee surgery (i.e., a second knee replacement when the original fails) is aseptic loosening. In 2006, it was estimated that 20-25 per cent of joint replacements were revisions of prior surgery (AOA, 2011). While this compared well with most OECD nations, it was not as low as Sweden (10 per cent). The difference accounts for millions of dollars of (mostly private) healthcare expenditure, but, through the use of the National Joint Replacement Registry and other international registries, which identify early failure prostheses, it is an opportunity to reduce healthcare expenditure (Graves, 2006).

In 2008-09, 13,749 knee replacement procedures were performed in NSW, of which 7,060 were provided for people aged 65 years and over (AIHW, 2011a). The chart shows the age-sex standardised rate of knee replacements performed per 100,000 population aged 65 and over, in NSW public and private hospitals, by local health district of usual residence.

Findings: Across NSW, the 2009 age-sex standardised rate of knee replacements was 734 procedures per 100,000 population aged 65 and over. This is an increase from the 2005 rate of 711 per 100,000. Rates between local health districts varied significantly from 108 in Far West, and 595 in Northern NSW (the next lowest), to 833 in Central Coast.

Implications: The rate of knee replacements depends on various factors, including underlying disease such as osteoarthritis, overweight and obesity, changing community expectations, preferences of doctors and individuals, the rate of revisions, the supply of surgical services and improvements in surgical outcomes. By addressing some of these factors, it may be possible to influence the rate of knee replacements.

The burden of disease from degenerative musculoskeletal conditions in the Australian community is expected to increase substantially as the population ages over the next 15 years. Further, the growing problem of overweight and obesity (refer to Chart 2-1, p.29) has significant implications for knee replacement surgery provision in the future. Research conducted in Canada found that obese people were over three-times as likely, and overweight people one-and-a-half times as likely, to undergo joint replacement surgery, compared to those in the 'acceptable' weight category (de Guia, Zhu, Keresteci, & Shi, 2006).

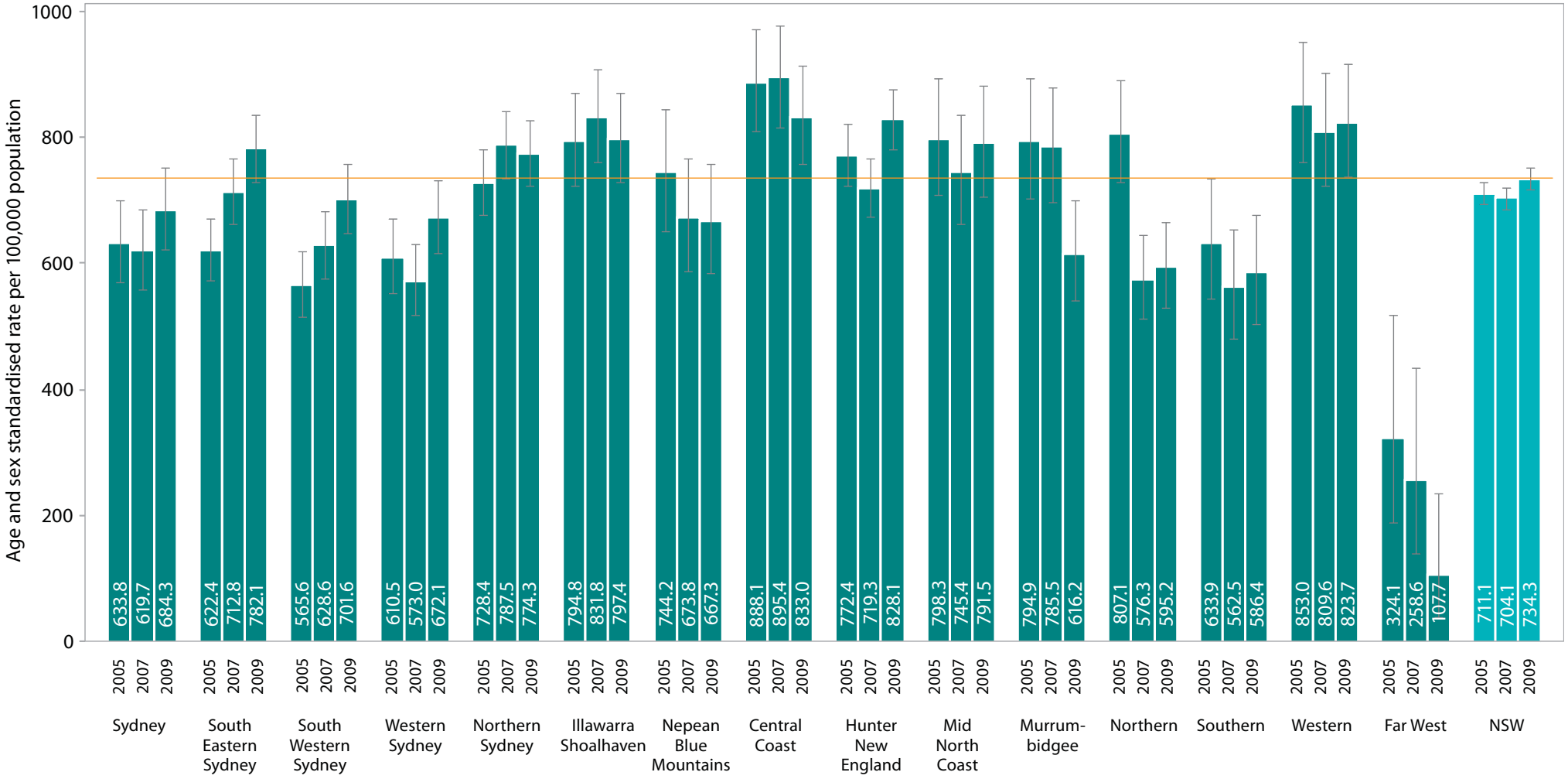
What we don't know: What is the relative impact of the key factors influencing the increased rate of knee replacements, i.e., underlying disease, changing community expectations, preferences of referring doctors, theatre and bed availability, rate of revisions and improvements in prostheses?

What is the impact on necessity for knee replacement surgery of large-scale interventions affecting activity and exercise, weight, diet and lifestyle limitations?

Access to knee replacement procedures

Chart 6-3

Knee replacement rate for people aged 65 and over, per 100,000 population by local health district of usual residence, 2005-2009

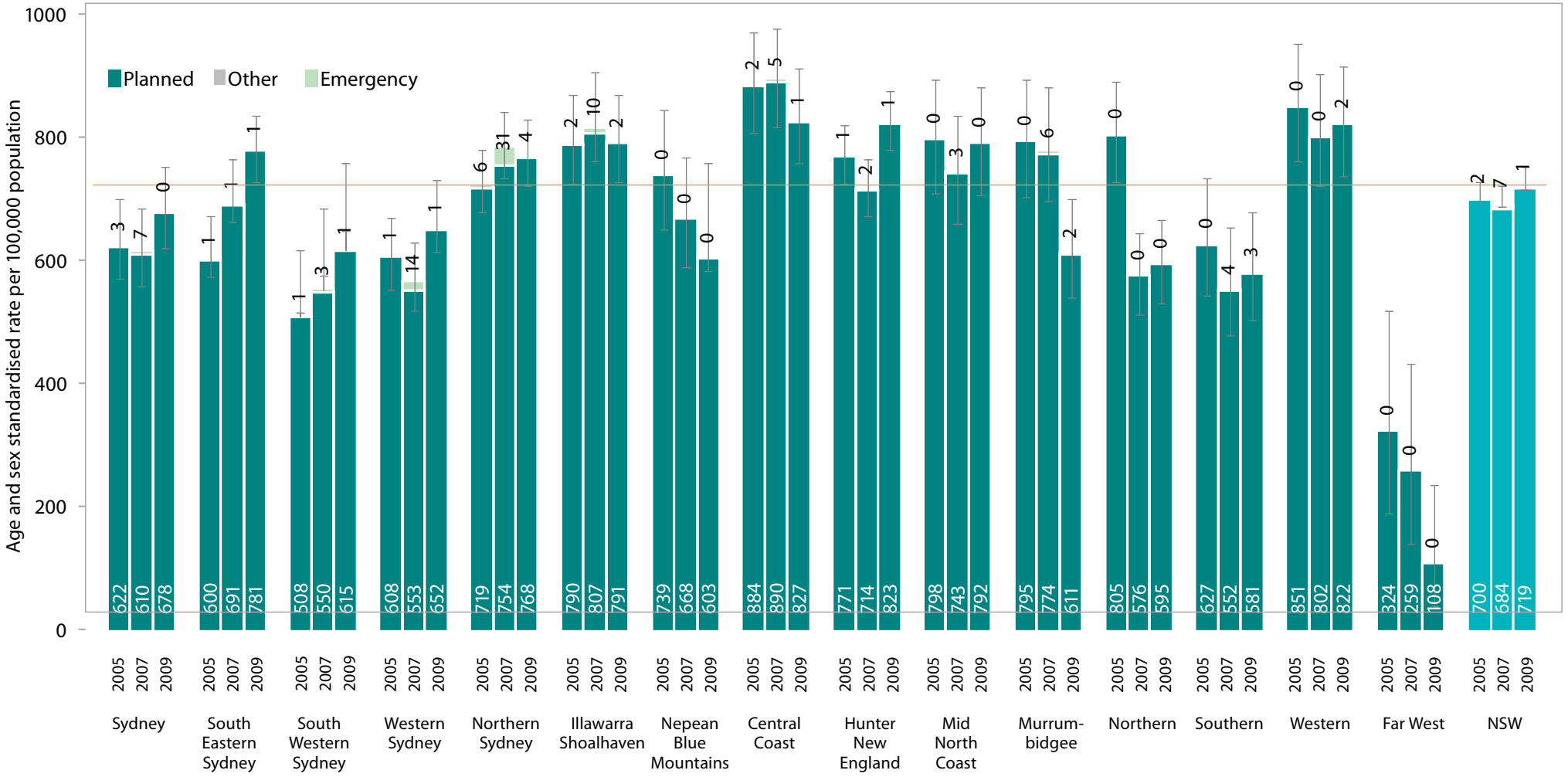


Source: NSW Admitted Patient Data Collection and ABS population estimates (HOIST), Centre for Epidemiology and Research, NSW Ministry of Health.

Provision of knee replacement procedures (planned/emergency)

Chart 6-4

Knee replacement rate for people aged 65 and over, per 100,000 population by local health district, 2005-2009



Source: NSW Admitted Patient Data Collection and ABS population estimates (HOIST), Centre for Epidemiology and Research, NSW Ministry of Health.

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RESPIRATORY DISEASE | Introduction

Chapter 7

The respiratory system includes the airways, the lungs, the respiratory centre of the central nervous system, the chest wall and the pulmonary circulation. Chronic respiratory diseases are a diverse group of illnesses that affect the process of breathing and oxygen delivery. As a group, they involve many and varied causative pathways, symptoms and outcomes. They are highly prevalent in the community and constitute a significant health problem in NSW. Nevertheless, effective prevention is possible because these diseases have some risk factors that are identifiable and avoidable. Respiratory diseases (including lung cancer), were responsible for 4041 deaths (around 14 per cent of all deaths) in NSW in the period 2003 to 2007. They represented about five per cent of hospital separations in 2008-09 (NSWDOH, 2010a).

Asthma is a chronic inflammatory disorder of the airways that results in obstruction of airflow in response to specific triggers. The overall prevalence of asthma in 2007-08, as reported in the National Health Survey, was 9.9 per cent, down from 11.6 in the 2001 survey (AIHW, 2010a). Across former area health services in 2008, estimated prevalence ranged from 9.3 per cent in Sydney South West to 13.7 per cent in Greater Western. Asthma was responsible for 130 deaths in 2007 and around 12,500 hospitalisations in 2008-09 (NSWDOH, 2010a). The cause of most cases is not known. A large proportion of asthma is developed in early childhood. The major risk factors include a family history of asthma and a genetic predisposition for allergic reactions. There is a range of common triggers, such as exercise, viral infections and allergens.

Chronic obstructive pulmonary disease (COPD) is a long-term lung disease, marked by shortness of breath, which initially occurs with exertion and becomes progressively worse over time. Tobacco smoking is overwhelmingly the strongest risk factor for COPD (AIHW, 2010a), leading to chronic bronchitis, airway narrowing and emphysema. It was responsible for over 1,700 deaths in 2007 and nearly 20,000 hospitalisations in 2008-09(NSWDOH, 2010a). The burden of COPD is not distributed equally. Prevalence rates are higher in males, older people, people from lower socio-economic background and Aboriginal and Torres Strait Islander people.

In 1998, an estimated 23.7 per cent of adults in NSW were current smokers. This fell to 17.2 per cent in 2009, a substantial reduction achieved in 11 years (CER, 2010).

Preventive measures, which include the identification and avoidance of risk factors and better management of both asthma and COPD, are the most effective method to reduce the burden of disease from these conditions. Regular review by a general practitioner, patient education and the use of a written management plan, are effective in reducing hospital admissions and attendance at emergency departments for asthma (Gibson *et al*., 2002). The COPD management strategy developed by NSW Health emphasises an integrated, co-ordinated and patient-focused approach that includes patient education, self-management of exacerbations and pulmonary rehabilitation (Monninkhof *et al*., 2003).

This chapter presents indicators covering hospitalisation rates for both asthma and COPD.

Why is this important? Asthma has been estimated to affect one in ten adults in NSW. While these prevalence rates are high by international standards (Pearce *et al*., 2007), asthma case fatality in NSW is very low – reflecting high standards of healthcare (NSWDOH, 2009b). Mortality rates across NSW decreased from 4.3 per 100,000 population in 1997 to 1.7 in 2007. Latest data shows that in 2007, 133 deaths were attributed to the disease (NSWDOH, 2010a). Following the worldwide increase in prevalence of asthma, particularly in children, in the 1980s and 90s, this trend appears to have reached a plateau in recent years (Asher *et al*., 2006). National data shows a decrease in prevalence among children and young adults, from 14 to 11.4 per cent between 2001 and 2004/05 (AIHW, 2010a). While hospitalisation rates have decreased since the early 1990s, asthma still accounts for over 13,000 admissions per year in NSW. Many asthma hospitalisations are potentially preventable with effective primary care. National guidelines recommend that patients should have a written asthma action plan for the management of their disease (AIHW, 2005a). The 2008 NSW Health Survey found that 45 per cent of adults with symptoms of asthma in the previous 12 months, had a written asthma plan (CER, 2007).

The diagnosis of asthma is the most reliable in those aged 5-34 years and data is presented for this age group.

Findings: Among people aged 5-34, 3,181 were admitted for asthma in 2009, a rate of 114.5 per 100,000 population in that age group. These figures represent a significant reduction on 1996-97 data of 6,724 hospitalisations and a rate of 249.2 per 100,000 people. The chart shows that hospitalisation rates for asthma fluctuated between 2005 and 2009 across all local health districts, ranging from 88 per 100,000 aged 5-34 years in Northern Sydney to 143 in Northern NSW and 144 in Nepean Blue Mountains.

People in the least disadvantaged socio-economic quintile have a substantially lower age-sex-standardised admission rate (87.5 per 100,000 population aged 5-34 years) than those in the most disadvantaged quintile (155.8) (CER, 2011c).

Implications: Admission rates for asthma are influenced by many factors, including severity and prevalence of the disease, effectiveness of asthma management, accessibility of hospital services, changes in admission criteria, availability of primary healthcare and environmental factors such as airborne irritants. Asthma sufferers who were educated about their asthma, visited their general practitioner regularly and who used a written management plan, had fewer hospital admissions and emergency department attendances. They experienced better lung function, improvement in peak expiratory flow, had fewer symptoms and used less rescue medication (Gibson & Powell, 2004). The aims of an asthma management plan are to prevent the occurrence of asthma attacks, identify trigger factors, minimise the symptoms, maintain the best lung function and minimise side-effects from medication. NSW Health has released detailed guidance on how to reduce avoidable asthma admissions - *Avoidable admission model of care NSW Health, 2007* (available at http://www.archi.net.au/documents/e-library/hsp/avoid/nsw-strategy/characteristics/bronchitis.pdf). Opportunities exist to treat a greater proportion of patients in non-admitted settings.

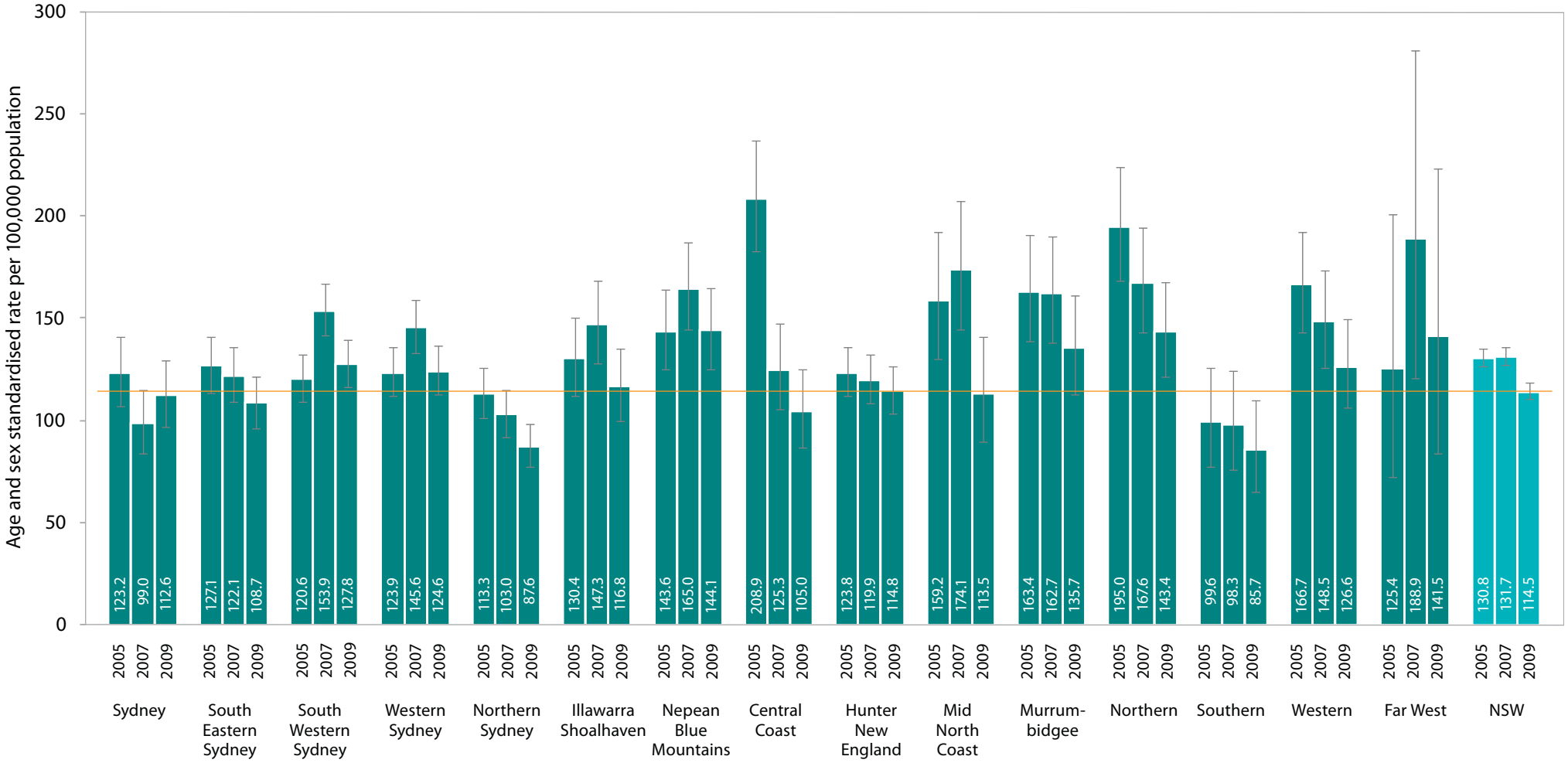
What we don't know: What is an appropriate rate of admission per 100,000 population for asthma, based on best practice?

Why do only 45 per cent of adults with asthma in NSW have a written asthma plan, despite the evidence of the benefits of such a plan?

Asthma hospitalisations

Chart 7-1

Asthma hospitalisation rate per 100,000 population for people aged between 5 and 34 years by local health district of usual residence, 2005-2009



Source: NSW Admitted Patient Data Collection and ABS population estimates (HOIST), Centre for Epidemiology and Research, NSW Ministry of Health.
Notes: Rates were standardised by using Australian population at 30 June 2001.

Why is this important? Chronic obstructive pulmonary disease (COPD) is a major public health problem and results in significant morbidity and mortality in NSW. A long-term lung disease, COPD is marked by shortness of breath that initially occurs with exertion and becomes progressively worse over time. Tobacco smoking is overwhelmingly the strongest risk factor for COPD (AIHW, 2008b) leading to chronic bronchitis, airway narrowing and emphysema. Smoking caused an estimated 1,208 deaths from COPD (679 males and 529 females) in NSW in 2006. This represented 20.7 per cent of all male and 29.4 per cent of all female smoking-attributable deaths. Between 1997 and 2006, the age-adjusted rate of COPD deaths attributable to smoking declined by 41.1 per cent, from 27.0 to 15.9 deaths per 100,000 population. The decline was considerably greater in males (47.5 per cent) than in females (33.1 per cent) (NSWDOH, 2008a). In 2007, 1,756 people in NSW died from COPD (NSWDOH, 2010a). The prevalence is difficult to determine, because of variability in disease diagnosis, definition and recording. On the basis of self-reports in the National Health Survey, around three per cent of the total population and about eight per cent of those aged 65 and over, were estimated to have emphysema and chronic bronchitis in 2004-05 (AIHW, 2008b). Over three-quarters of COPD hospitalisations are people aged 65 and over. The majority are considered to be potentially avoidable admissions, i.e., that could have been avoided through disease prevention or more timely or improved care processes (BHI, 2011). Many COPD hospitalisations are considered to be largely preventable with optimal management. COPD was identified as one of the priority healthcare program areas for NSW Health in 2002. Programs established in a number of former area health services aimed to reduce hospital admissions through a range of measures, including improved integration of care between acute services and GPs, self-management programs, pulmonary rehabilitation and smoking cessation.

Findings: There were 19,104 admissions for COPD in 2009, a rate of 240 per 100,000, down slightly from 246 in 2008. Of the total admissions, 97 per cent were to public hospitals and 90 per cent were unplanned (CEC, 2011). In 2009, age and sex-standardised hospitalisation rates per 100,000 population by local health district (LHD) of usual residence ranged from 113 in Northern Sydney to 427 in Western NSW. The age-sex standardised admission rate is significantly higher in remote areas (677 admissions per 100,000) than major city locations (215). More than 77 per cent are aged 65 and over. There is a strong association between socio-economic status and admission rates for COPD, with the most disadvantaged having a rate (338 per 100,000) almost three times that of the least disadvantaged (124) (CEC, 2011).

Implications: The ageing of the population has the potential to result in increased admission rates for COPD. In contrast, continuing efforts to reduce smoking rates and enhanced management of exacerbations on the community will exert a downward pressure on rates. The considerable variation in COPD hospitalisation rates between LHDs, for what is considered to be a potentially avoidable admission, indicates the potential for greater focus on disease prevention and timely or improved care processes. Four key areas that will drive improvements in quality have been identified:

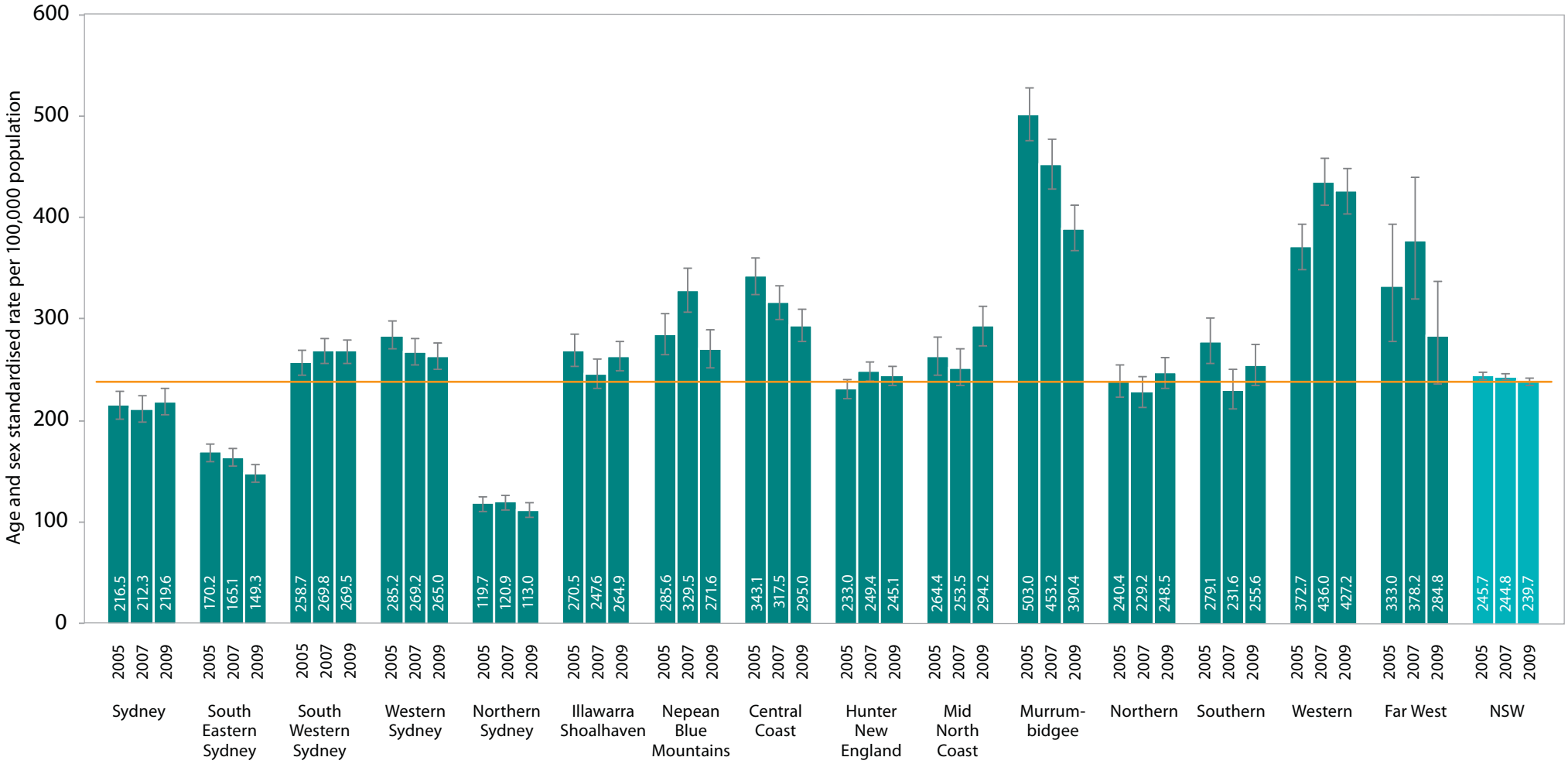
- prevention (including smoking cessation)
- early diagnosis and optimal treatment
- greater awareness and uptake of pulmonary rehabilitation
- improved access to oxygen therapy (Menzies Centre for Health Policy, 2007).

What we don't know: What is an appropriate rate of admission per 100,000 population for COPD based on best practice?

Chronic obstructive pulmonary disease (COPD)

Chart 7-2

Chronic obstructive pulmonary disease (COPD) admission rate per 100,000 population by local health district of usual residence, 2005-2009



Source: NSW Admitted Patient Data Collection and ABS population estimates (HOIST), Centre for Epidemiology and Research, NSW Ministry of Health.
Notes: Rates were standardised by using Australian population at 30 June 2001.

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ENDOCRINOLOGY | Introduction

Chapter 8

Endocrinology focuses on the endocrine system - a complex group of glands that secrete hormones - which includes the thyroid, parathyroid, pancreas, ovaries, testes, adrenal, pituitary and hypothalamus. The hormones produced by these glands play an important role in many body functions, including metabolism, reproduction, growth and development. This chapter focuses on one area of endocrinology, diabetes mellitus.

Diabetes mellitus is a disease in which the body does not produce, or properly use, insulin. Insulin, a hormone produced by the pancreas, is needed to convert sugar, starches and other food into energy. Insulin deficiency results in the high blood sugar levels characteristic of diabetes. Diabetes is associated with serious chronic ill-health, disability and premature mortality. Long-term complications include heart disease, stroke, blindness, kidney disease and amputations. There are three main forms of diabetes: type 1 results from the body's failure to produce insulin; type 2 results from insulin resistance (or sub-optimal use of insulin); and, gestational diabetes results from increased resistance to insulin that occurs in pregnancy. Type 2 diabetes is the most common form – 90 per cent of people with diabetes have type 2. Obesity is closely linked with type 2 diabetes.

In 2006, diabetes was the principal cause of 952 deaths in NSW (12.5 deaths per 100,000 population). It often plays an indirect role as a significant risk factor for heart and kidney disease and stroke. In 2006, there were 2291 diabetes-related deaths in NSW (30.0 per 100,000 population) where diabetes was either the underlying, or an associated, cause of death (NSWDOH, 2009b).

The Australian Diabetes, Obesity and Lifestyle (AusDiab) Study estimated that, in 1999-2000, 880,000 Australians aged 25 and over had diabetes - 7.4 per cent of adults (AIHW, 2008a). The more limited AusDiab follow-up study in 2006 (Barr, 2006), reported that approximately 100,000 people per year are developing diabetes, suggesting an expected doubling in prevalence over the last decade. In 2009, 8.2 per cent of adults (9.4 males and 7.0 females aged 16 and over) in NSW reported having diabetes or high blood sugar (CER, 2007). The prevalence of self-reported or known diabetes in NSW thus increased from 4.4 in 1998 to 8.2 per cent in 2009 – an 86 per cent increase. Furthermore, given the above data comparing those with diagnosed diabetes, with the available community studies testing for diabetes prevalence in the Australian population, it is likely that there are many people with diabetes who are not aware they have it.

The burden of diabetes is not distributed equally across the population. Age and socio-economic status are highly correlated with diabetes prevalence. Prevalence rates are higher in males than in females, among people living in remote areas, or from lower socio-economic background and Aboriginal and Torres Strait Islander people (see also, pages160-161), whose age-standardised prevalence rate is almost three times that of non-indigenous Australians - 11 and 4 per cent (AIHW, 2008a). Recent mapping of diabetes incidence in NSW has identified substantial increases in the rate of diabetes in coastal retirement areas of NSW, with rates increasing by between 30 and 40 per cent over five years in areas such as Port Macquarie and Coffs Harbour (Barclay, 2011).

Careful control of blood sugar levels through diet, exercise, medication and, where required, insulin injections, is vital to prevent complications for people with diabetes. As well as blood sugar control, assiduous attention to the monitoring and management of lipids, blood pressure and weight control is required. Continuity of medical care in the form of "shared care" carried out by GPs, in collaboration with local diabetes centres and/or private endocrinologists, has been shown to have positive benefits, including reduced risk of complications (Mainous, Koopman, Gill, Baker, & Pearson, 2004). Control of risk factors for cardiovascular disease is also important for people with diabetes.

According to the AIHW (AIHW, 2008e), diabetes was responsible for 5.5 per cent of the total burden of disease in Australia in 2003. When its contribution to circulatory conditions, such as stroke and heart disease was included, it accounted for 8.3 per cent of the total disease burden.

This chapter presents indicators related to diabetes care, including hospitalisation rates and amputations, as an example of the complications that can arise.

Why is this important? Diabetes is associated with serious chronic ill-health, disability and premature mortality. If left undiagnosed, or poorly controlled, diabetes can lead to a range of complications, including coronary heart disease, peripheral vascular disease, stroke, diabetic neuropathy, renal failure, amputations and blindness. The economic costs are substantial – across Australia over $1billion is spent on direct costs alone, of diabetes care each year (AIHW, 2008a). Many of the long-term effects of diabetes and the associated separations (hereafter called hospitalisations), can be avoided with effective control of blood pressure and blood sugar levels (UKPDSG, 1998). Hence, hospitalisation rates can be used as a proxy measure for quality of care, with higher rates representing poorer performance. It is notable that, while type 1 accounts for about 10 per cent of all diabetes cases, it is responsible for 20 per cent of all diabetes hospitalisations (NSWDOH, 2008a). Hospitalisation rates for type 1 diabetes have been fairly stable, while the rates for type 2 have reflected the substantial increase in prevalence over the past decade.

Findings: In 2009, there were 26,203 admissions to NSW hospitals with diabetes as the principal diagnosis (a rate of 346 per 100,000 population). Annual age-sex standardised separation rates from NSW hospitals increased from 313 per 100,000 in 2005 to 346 in 2009. Rates increased significantly between 2004 and 2007 and have levelled off since then (CEC, 2010). In 2009, separation rates per 100,000 population ranged across local health districts - from 243 in Northern Sydney, to 415 in South Western Sydney. It should be noted that the rate of 149 per 100,000 for Southern NSW in 2009 does not include resident flows to ACT hospitals.

Chart 8-1 shows hospitalisation data for those episodes of care where diabetes was recorded as the principal diagnosis. Diabetes is more frequently reported as an additional or associated diagnosis (a comorbidity), rather than principal, diagnosis. In 2007-08 there were 147,192 hospitalisations with diabetes as a comorbidity, a rate of 1,954 per 100,000 people(NSWDOH, 2009b).

Implications: The reasons for hospitalisation among people with diabetes are diverse. Cardiovascular diseases were the most common principal diagnoses for diabetes-related hospitalisations. When diabetes was listed as the principal diagnosis, the most common comorbidities were eye complications, followed by multiple complications, poor diabetes control and kidney complications. Sustained, individualised management, incorporating a combination of diet, exercise and medication (including insulin injections), frequent monitoring of blood glucose levels, cholesterol, blood pressure and regular screening for complications, such as eye and foot examinations, has been shown to reduce the risk of complications and therefore hospitalisation rates, substantially, in people with diabetes. Evidence-based guidelines have been published nationally (ACDS, 2001; NHMRC, 2005) to guide clinical efforts in diabetes management (NSWDOH, 2009b). The rising hospitalisation rates, however, are not necessarily an indicator of suboptimal care. Recent years have seen increasing levels of overweight and obesity, substantial increases in the prevalence of type 2 diabetes and increases in life expectancy and health-compromising comorbidities.

A national program – the *annual cycle of care* – is in place to promote and create incentives for effective treatment of chronic conditions in primary care. Data from Medicare claims in 2008-09, indicates that in NSW, 19.9 per cent of people with diabetes received the recommended annual cycle of care - compared to 19.8 nationally, 21.4 in Victoria, 22.7 in South Australia and 25.4 in Tasmania. (SCRGSP, 2010).

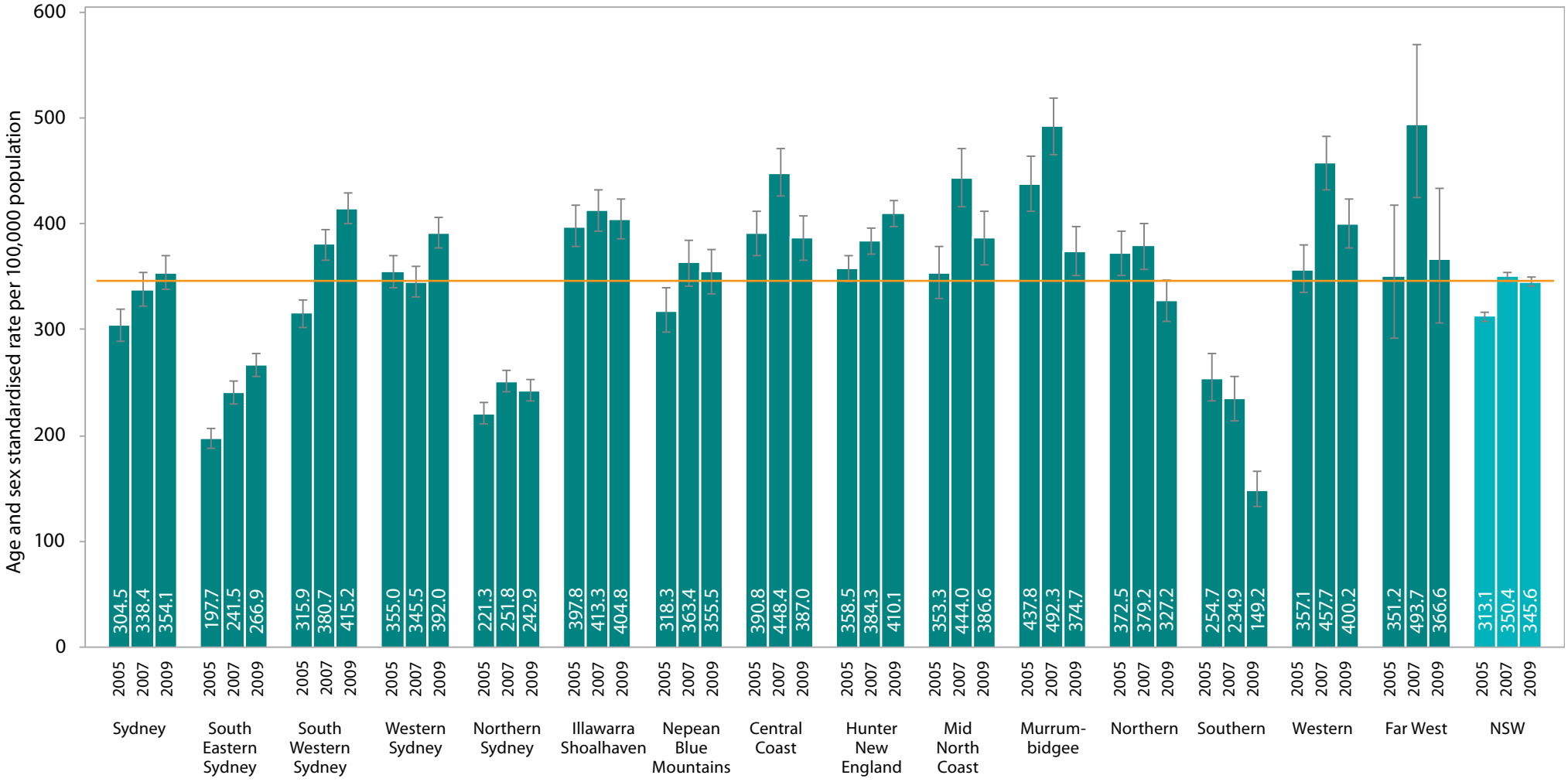
What we don't know: To what degree is the increase in diabetes hospitalisation rate due to the increase in prevalence?

To what degree is the variation in hospitalisation rates for diabetes related to access to general practitioners and diabetes clinics?

Diabetes hospitalisations

Chart 8-1

Diabetes separation rate (primary diagnosis) per 100,000 population by local health district of usual residence, 2005-2009



Source: NSW Admitted Patient Data Collection and ABS population estimates (HOIST), Centre for Epidemiology and Research, NSW Ministry of Health.
Notes: Rates were standardised by using Australian population at 30 June 2001.

Why is this important? Diabetes places a significant burden on the people of NSW, both in terms of human suffering and in economic costs. One of the most common complications associated with the disease is neuropathy (nerve damage). Neuropathy results in reduced sensation of pain and discomfort from foreign bodies, injury, or even tightly fitting shoes – all of which can cause foot trauma and ulceration. Damage to nerves can also cause wasting of the foot muscles, reduced joint mobility and foot deformities, such as claw- or hammer-toes, that are vulnerable to ulceration. Foot ulceration is a common reason for admission for people with diabetes and is estimated to precede more than half of all diabetes-related amputations(AIHW, 2008a).

Amputation is estimated to be 15 times more common in people with diabetes than in the general population. Many patients with diabetes who undergo amputation will, within a few years, undergo further amputation on the remaining limb, as it becomes more vulnerable to ulceration and infection, because of the extra pressure it has to bear (AIHW, 2008a).

Effective long-term glucose control, diabetes education and foot care are some of the interventions that can reduce the incidence of infection, neuropathy and microvascular diseases.

Findings: Between 2005-09, the rate of lower extremity amputations for people with diabetes remained steady at around 12 per 100,000 population. The age standardised rate for NSW in 2009, for 'toe, foot or ankle' amputations was 7.8 per 100,000. This rate was 1.9 for 'below the knee' and 1.1 for 'above the knee' amputations. In 2009, there were 916 hospital admissions for lower extremity amputations in NSW. Approximately 72 per cent were on the toe, foot or ankle, 18 per cent below the knee and 10 per cent above the knee. The rate of amputations decreased in most local health districts in 2009, compared to previous years. Rates in 2009 varied between 6.8 per 100,000 population in Northern Sydney and 37 in Far West.

Implications: As well as recommending good glycaemic control as a key goal of diabetic care generally, guidelines from the NHMRC emphasise the importance of identifying those people with diabetes who are at increased risk of amputation. Patients with foot ulcers or with high-risk feet should receive specific foot care education and be cared for by a multi-disciplinary team that includes a physician and podiatrist and should have ready access to a specialist nurse, orthotist and surgeon (NHMRC, 2005).

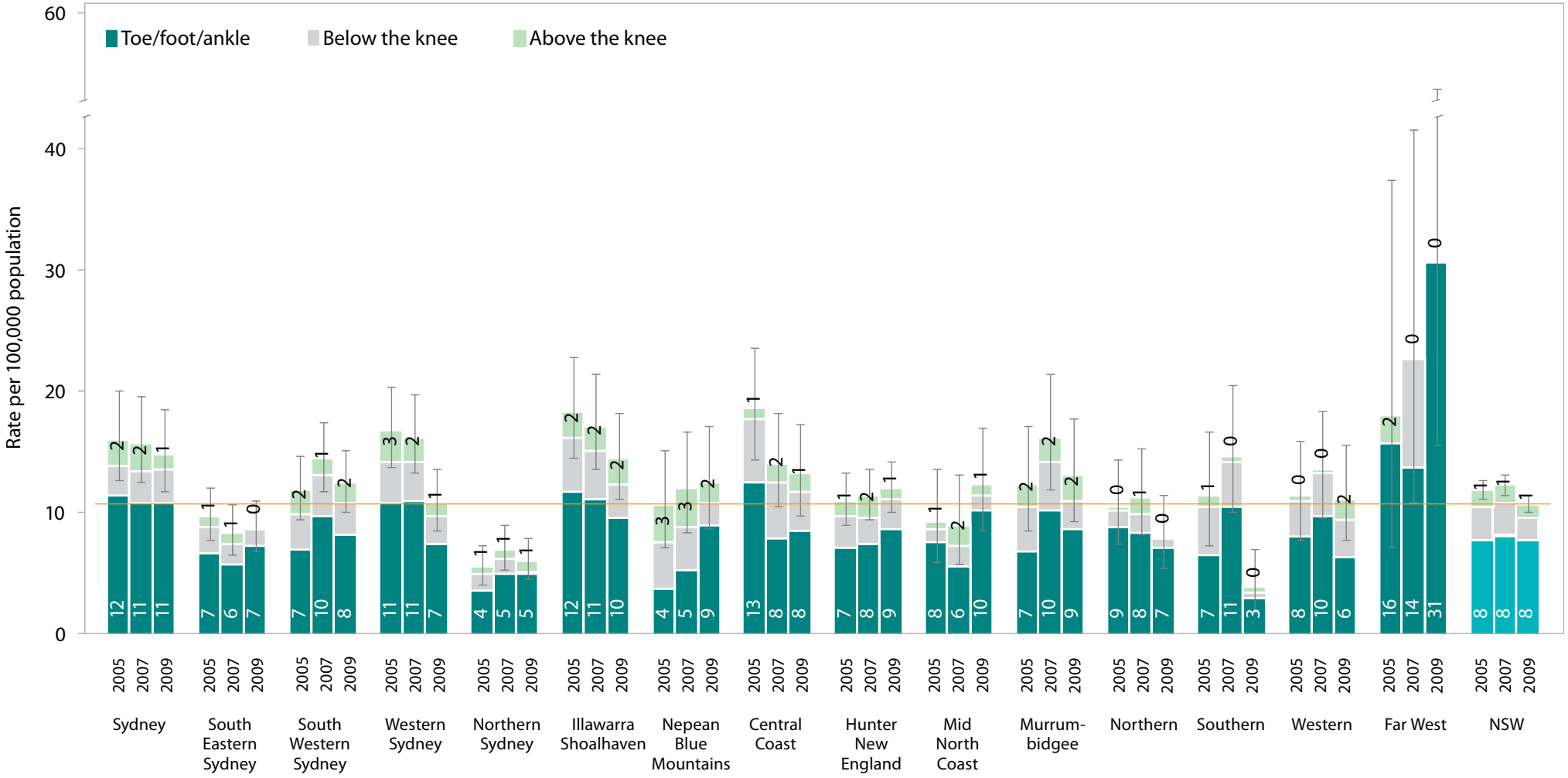
Six-monthly foot examinations are part of the annual cycle of care for people with diabetes – a national program to promote appropriate and effective treatment for chronic conditions in primary care. In 2008, around one in five people with diabetes in NSW received the annual cycle of care treatments, in line the national rate.

What we don't know: Given the increasing prevalence of diabetes, a steady rate of lower extremity amputations is noteworthy. The extent to which the steady rate is artefactual, however - with the increasing prevalence not yet manifested in complications requiring amputation - is unknown.

Amputations for people with diabetes

Chart 8-2

Age and sex standardised rate of lower extremity amputations with diagnosis of diabetes per 100,000 population, by site of amputation and local health district of usual residence, 2005-2009



Source: NSW Admitted Patient Data Collection and ABS population estimates (HOIST), Centre for Epidemiology and Research, NSW Ministry of Health.

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MATERNITY SERVICES | Introduction

Chapter 9

There were 96,439 births in NSW in 2009, an increase of 6.4 per cent over 2005 (90,610 births). In 2009, the vast majority occurred without complications, following a clinically uneventful pregnancy. Out of every ten, about six women (58.2 per cent) had spontaneous vaginal births, around three in ten (30.2 per cent) had caesarean sections and one in ten (11 per cent) had births involving forceps, vacuum extraction or vaginal breech delivery (CER, 2011b). The mean maternal age is now 30.7 years. Increased maternal age is a major risk factor in pregnancy. Around one in five mothers in NSW were aged 35 years and over. The increasing trend for medical intervention in childbirth has been the subject of considerable debate in recent years, resulting in the development of plans and policies designed to promote a reduction in intervention rates (AHMAC, 2011; NSWDOH, 2010a).

Maternal deaths are rare, with less than ten deaths per year reported among pregnant women. There were 827 peri-natal deaths of at least 20 weeks gestation in 2009, a mortality rate of 8.7 per 1,000. The rate of low birth-weight babies (less than 2,500 grams) has been steady at 6.0 per cent. Around 92.7 per cent of babies are born at term (37-41 weeks gestation). The percentage born prematurely has remained stable at around 7.3 per cent. In 2009, there were 13,649 infants admitted to special care or neonatal intensive care units, a rate of 14.4 per cent of live births. Indicators for the high-risk babies admitted to neonatal intensive care units are presented in Chapter 10.

Pregnant women receive antenatal screening to monitor the condition of both the mother and her foetus. Screening may identify possible maternal risk factors, including maternal age over 30 years, family history of diabetes, poor obstetric history, maternal obesity, mental health and drug and alcohol issues. Good quality evidence exists to support the cessation of smoking during pregnancy (Lumley, Oliver, & Waters, 2000; Lumley, Oliver, Chamberlain, & Oakley, 2004). Mothers may be referred to specialist multidisciplinary clinics to receive education and treatment for these risk factors.

"Best practice" in maternity care can be defined as the care that provides for the best possible outcomes for women and babies in terms of clinical safety and effectiveness. Primary care is usually provided by midwives or general practitioners. Obstetricians usually provide secondary and tertiary care, along with other medical colleagues and midwives. Where women have identified risks, or have developed complications, they are referred to secondary or tertiary services. Research has emphasised the need for women to be informed of their options regarding pregnancy care and the implications of each option in terms of cost, continuity and the transition from hospital to home (SHW&CH, 2001).

Overall, NSW mothers and babies enjoy very good health. Aboriginal and Torres Strait Islander mothers and babies and those from socio-economically disadvantaged areas, continue to have poorer health (NSWDOH, 2008a).

While the NSW health system continues to show improvements in the indicators for maternal and child health and is generally good by world standards, challenges remain. These include increasing breastfeeding rates, improving access to antenatal care in rural and remote regions, ensuring an effective continuum of care across the antenatal, intra-partum and post-partum periods and addressing variations in rates of intervention for episiotomies and caesarean sections (NSWDOH, 2006h).

This chapter presents a number of indicators related to child and maternal services, including timely initiation of antenatal care, caesarean section rates, episiotomy rates and perineal tears, unassisted vaginal deliveries and infant well-being at birth.

Why is this important? The purpose of antenatal care is to monitor the health of both the mother and baby, provide advice to promote their health, to identify antenatal complications and to identify and manage risk factors in pregnant women and their unborn children. Women in developed countries typically attend regular prenatal visits, usually seven to 11 times per pregnancy. The first 12 weeks of pregnancy are a time of organ formation and heightened vulnerability to teratogens – agents that cause birth defects or foetal death. Antenatal care typically consists of history-taking, directed physical examination, to detect conditions associated with increased maternal and perinatal morbidity and mortality and counselling about risk behaviours and appropriate diet. The evidence supporting these practices, however, is variable (Kirkham, Harris, & Grzybowski, 2005).

Antenatal care is recommended during the first trimester (in the first three months) and throughout pregnancy. For this indicator, timely initiation is regarded as being the first antenatal visit before 20 weeks of gestation (see appendix). First trimester visits are primarily to assess maternal and foetal well-being, particularly the risk of complication, to date the pregnancy, take a comprehensive history, discuss smoking behaviour and establish care options.

The care during this period is critical for mother and baby, because many miscarriages, or initiation of the cause of later deaths, occur then. Pregnant women are at risk for high blood pressure, gestational diabetes and other disorders. Late initiation of antenatal care can result in higher risks for the baby, including low birth-weight, stillbirth, or death within the first year of life. The babies of teenage mothers are especially at risk. The data presented in these charts is for local health district of usual residence of the mother.

Findings: In 2009, 92.8 per cent of NSW mothers had their first antenatal appointment before 20 weeks gestation. This represents a significant improvement over the 88.3 per cent recorded in 2005. Across local health districts (LHDs) in 2009, the percentage ranged from 83.4 in Sydney to 97.2 in Northern Sydney. Increases in the percentage of mothers receiving antenatal care before 20 weeks gestation were seen across most LHDs in the period 2005 – 2009. The most marked improvement was recorded in Far West, with an increase of 14 percentage points, from 79.4 to 93.4. The one LHD where there was a significant decrease in early initiation of antenatal care was South Western Sydney where the rate decreased from 89.1 in 2007 to 85.3 in 2009.

This data is collected in the Midwives Data Collection by hospital maternity services. Mothers are asked to identify the duration of pregnancy at first antenatal visit. It is possible that the data may not effectively take into account prior visits to the general practitioner, including for shared care. This may partially explain the lower rate of antenatal initiation in Sydney and South Western Sydney, which have a large obstetric shared care program. Data on the initiation of antenatal care for Aboriginal mothers is presented in Chapter 12.

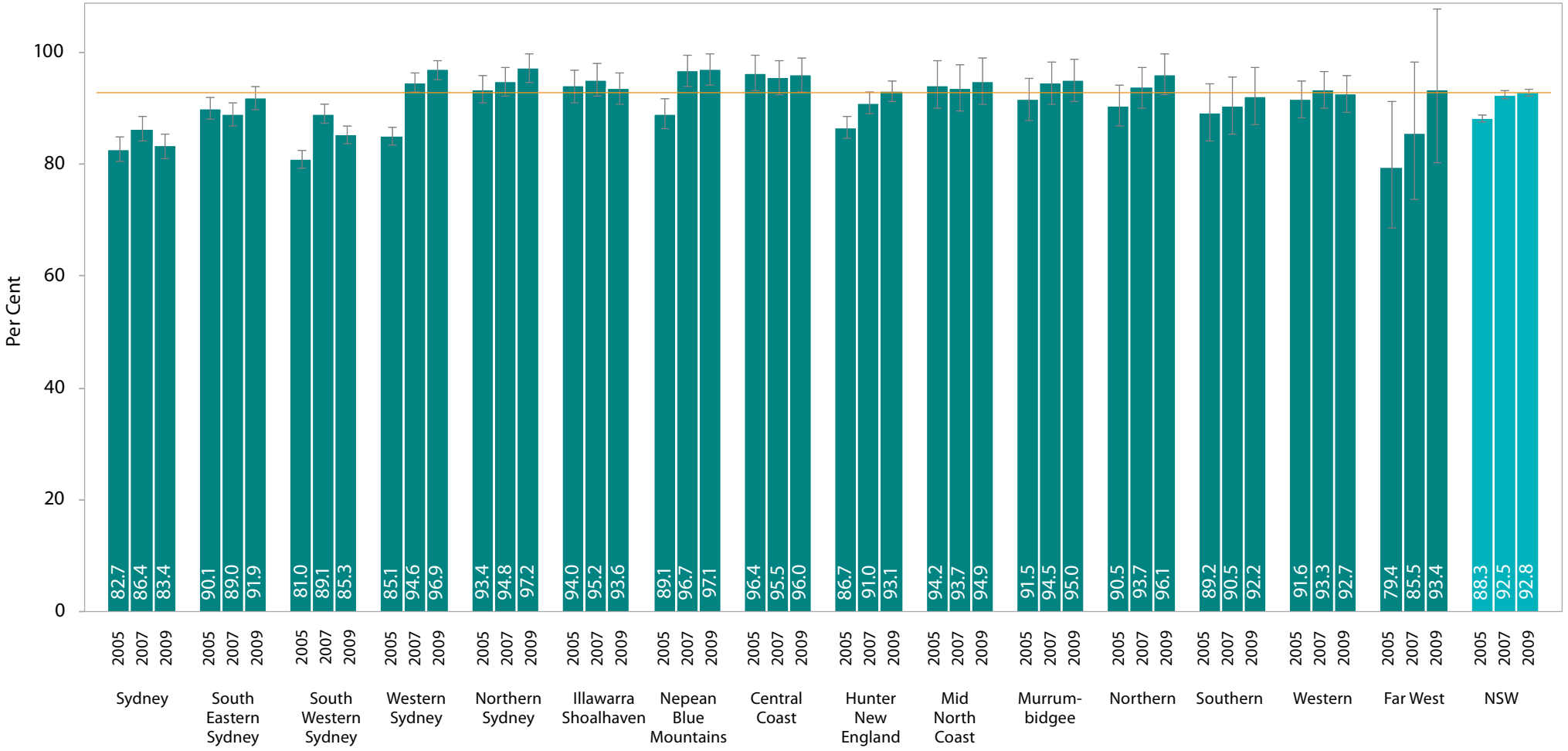
Implications: This indicator is an important measure of access to essential health services that impact on the health outcomes of the mother and child. It does not tell us the reasons for seeking care, the skills of the provider, or the quality of care received. Women's use of antenatal care, however, is more strongly associated with improved perinatal survival (McDonagh, 1996). Efforts to improve timely initiation of antenatal care are required, particularly in very remote and disadvantaged areas. A Cochrane Review (Villar, Carroli, Khan-Neelofur, Piaggio, & Gulmezoglu, 2001) found that reducing the number of antenatal visits did not lead to increased adverse outcomes for the mother or infant. Women were, however, less satisfied with the reduced-visit schedule.

What we don't know: What are the reasons for lower rates of early antenatal engagement in parts of Sydney?

First antenatal visit before 20 weeks of gestation

Chart 9-1

Percentage of women who have their first antenatal visit before 20 weeks of gestation by local health district of usual residence, 2005-2009



Source: NSW Midwives Data Collection (HOIST). Centre for Epidemiology and Research, NSW Ministry of Health.

Why is this important? The public health community has been concerned for many years about the increasing rate of caesarean sections in childbirth. A caesarean section is indicated when there is a significant risk to the health of the mother or baby. It can be performed as:

- A planned procedure, scheduled because of patient preference, or because the medical need for the operation becomes apparent during the pregnancy.
- An emergency procedure, when circumstances during labour call for urgent delivery of the baby.

Although a common procedure, it still represents major abdominal surgery and any operation carries a certain amount of risk. In developed countries, mortality is three times higher in patients undergoing caesarean sections than vaginal deliveries, although it is unclear the extent to which this increased risk can be attributed to the procedure, or to other life-threatening conditions which precipitate an emergency caesarean delivery. From a financial perspective, hospitals typically use more resources to care for a mother who has a caesarean section birth than they do for one who has a vaginal delivery. Chart 9-2 illustrates caesarean section rates observed in women aged 20 to 34 years, giving birth for the first time to a single baby, with a cephalic presentation (head-first) and an estimated gestational age of 37 to 41 weeks – generally referred to as selected primipara. This cohort has a low likelihood of requiring a caesarean section for clinical reasons and therefore offer an opportunity to highlight variation in clinical practice. The data is presented by local health district (LHD) of usual residence of the mother. Chart 9-4 illustrates rates for vaginal birth after caesarean (VBAC). Given the available data, trial of labour is a reasonable option for many pregnant women with a previous caesarean section delivery (Cunningham *et al*., 2010). Both trial of labour and repeat caesarean section have important risks and benefits and these differ for the mother and the baby. The data in Chart 9-4 refers only to those women who had a primary caesarean section, who are therefore not in the low-risk category

Findings: Among women giving birth for the first time in NSW in 2009, the percentage of all caesarean sections was 31 per cent (19.9 per cent emergency plus 11.1 per cent planned) compared to 29.4 per cent in 2005. The rate has been steadily increasing over the past ten years. In 2009, rates ranged from 25.9 per cent in Northern NSW to 40.8 in Central Coast. Over the five-year period, the steepest increase was reported in Central Coast (5.9 percentage points). Between 2005 and 2009, the percentage of vaginal deliveries after primary caesarean remained steady at around 13.6 per cent. The percentage varies substantially between LHDs, from 7.4 per cent in Northern Sydney to 24 per cent in Southern NSW.

Implications: There are strong health and economic arguments to reduce the rate of elective caesarean sections. The increase is not associated with any clear overall benefit for the baby or mother, but is linked with increased morbidity for both (Villar *et al*., 2007). Babies delivered by elective caesarean have an increased risk of overall and serious respiratory morbidity (Hansen, Wisborg, Uldbjerg, & Henriksen, 2008). Serious maternal morbidity, including risks of hysterectomy, bowel and bladder injury, admission to intensive care and blood transfusion, increase progressively with increasing number of caesarean deliveries (Silver *et al*., 2006). It should be noted, however, that caesarean sections have become much safer in recent years, with anaesthetic improvements, prevention of thromboembolic problems, prophylaxis for infections and delaying the procedure until 39 weeks gestation, in order to reduce respiratory problems in the babies.

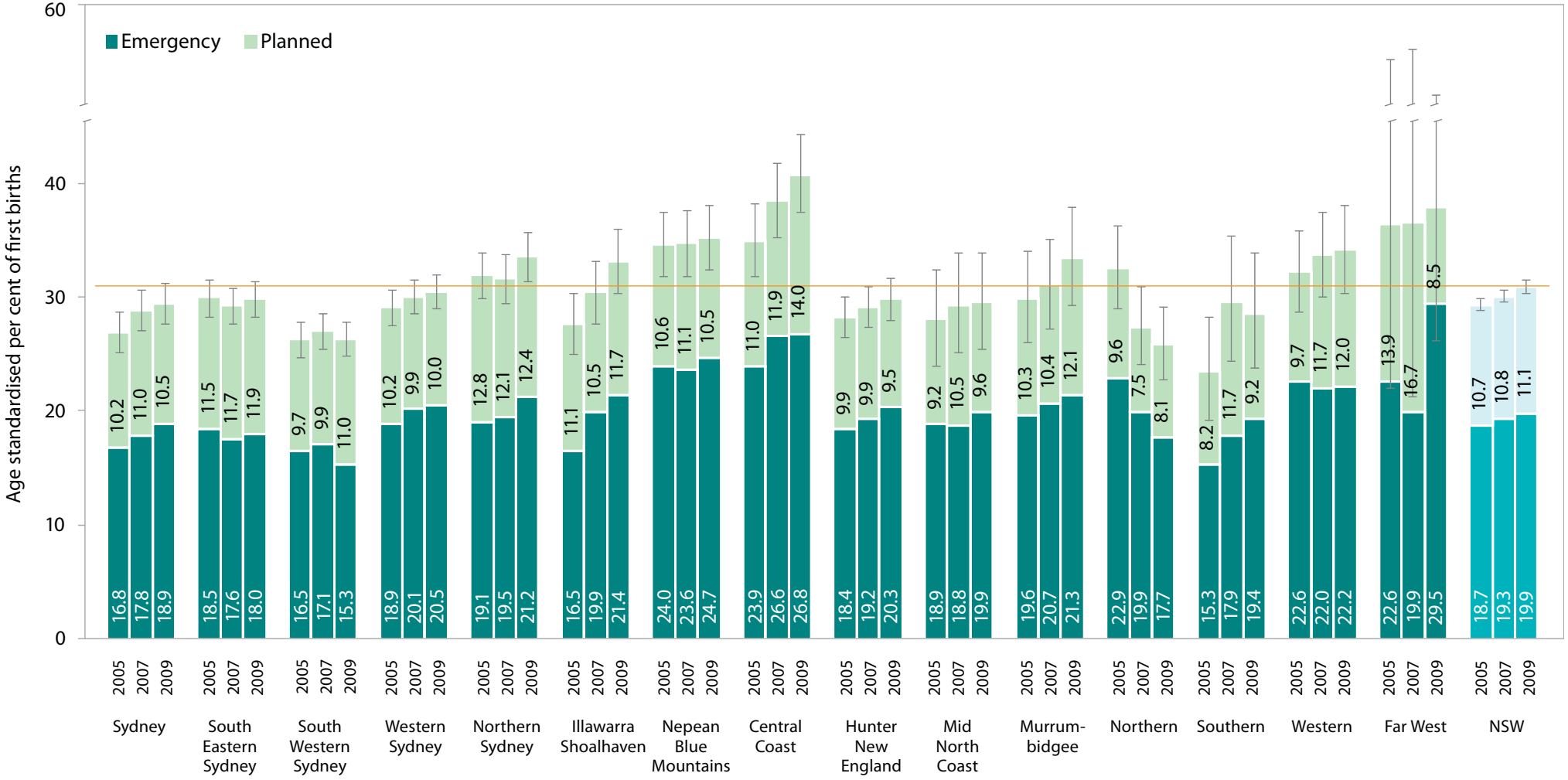
This evidence base led to the development of an action plan by the NSW Health Department, *Maternity – Towards Normal Birth in NSW* (NSWDOH, 2010c). This policy guideline aims to increase the vaginal birth rate in NSW and reduce the caesarean section rate, through a range of strategies. It also aims to ensure that midwives and doctors have the knowledge and skills to support women who choose to give birth without technological interventions unless necessary.

What we don't know: What are the precise quantifiable risks and benefits that might help to make an informed decision about trial of labour, compared with elective repeat caesarean delivery?

Caesarean section rates

Chart 9-2

Percentage of elective and emergency caesarean section among women giving birth for the first time, for selected primapara by local health district of usual residence, and emergency/planned status 2005-2009

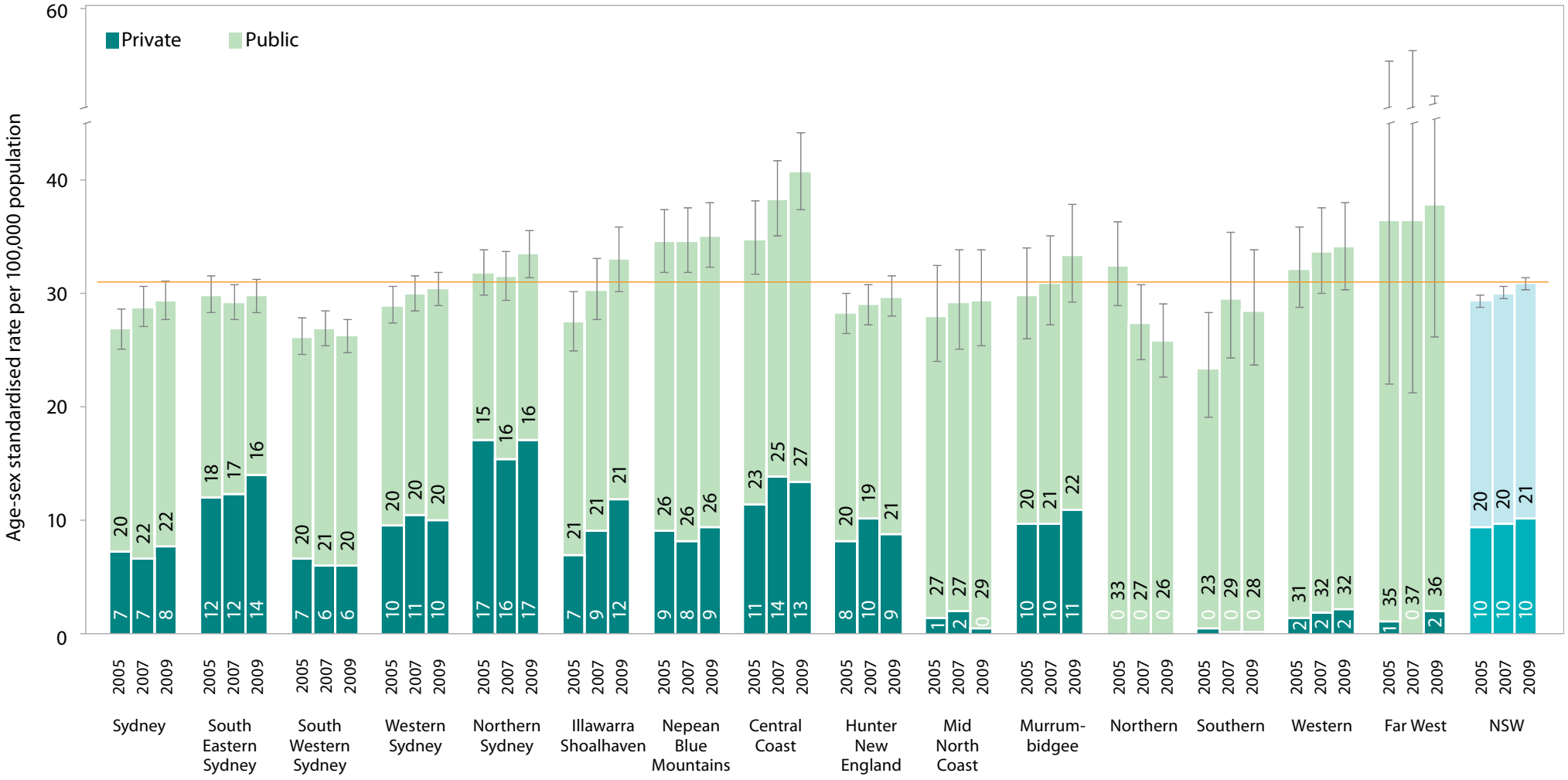


Source: NSW Midwives Data Collection (HOIST). Centre for Epidemiology and Research, NSW Ministry of Health.

Caesarean section rates (public/private)

Chart 9-3

Percentage of public and private hospital caesarean sections by local health district of usual residence, 2005-2009

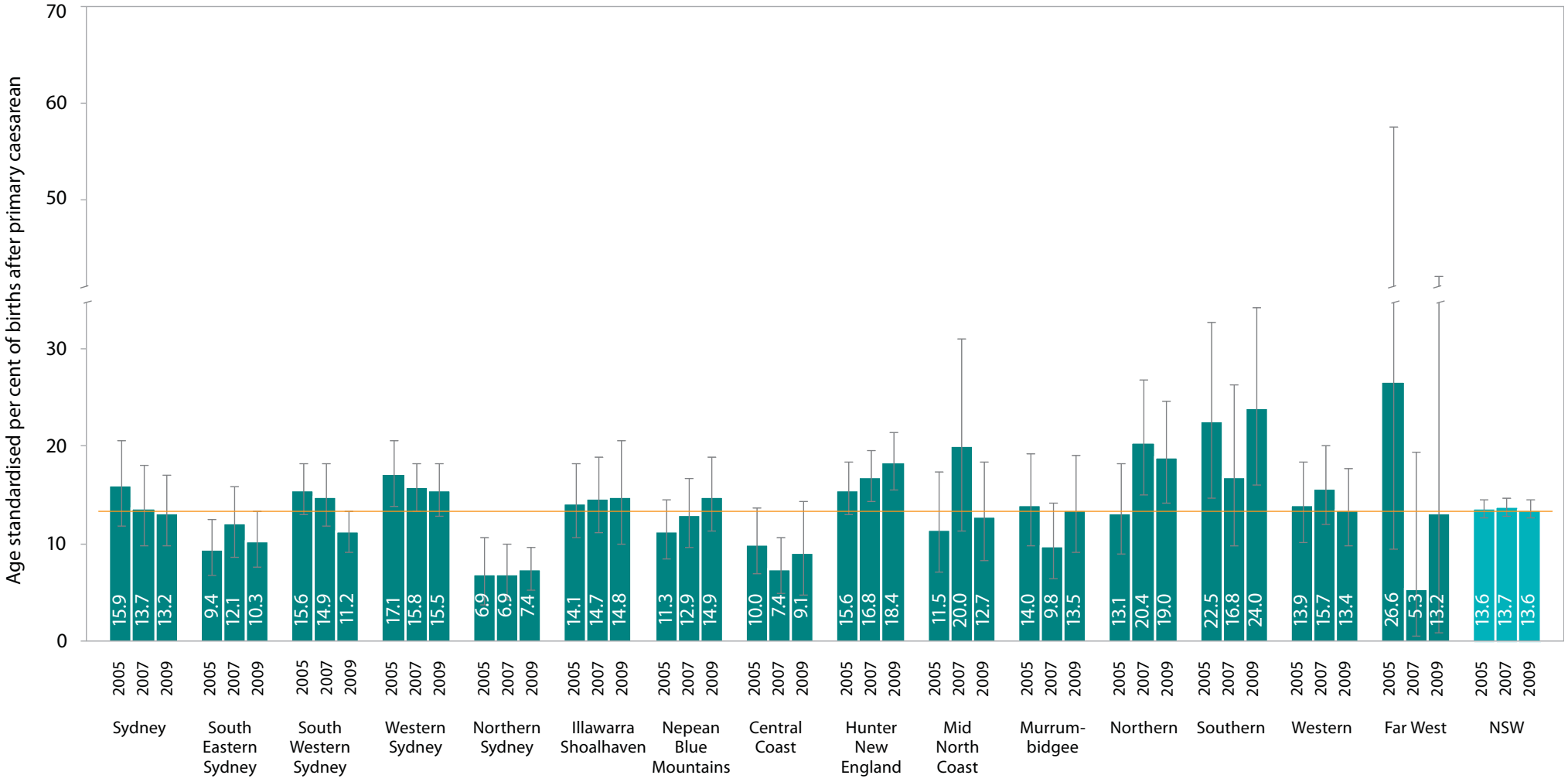


Source: NSW Midwives Data Collection (HOIST). Centre for Epidemiology and Research, NSW Ministry of Health.

Vaginal delivery following primary caesarean section

Chart 9-4

The percentage of vaginal births among women following primary caesarean section by local health district of usual residence, 2005-2009



Source: NSW Midwives Data Collection (HOIST). Centre for Epidemiology and Research, NSW Ministry of Health.

Why is this important? Episiotomy is one of the most common surgical procedures in the field of obstetrics. It is designed to facilitate vaginal delivery and to prevent obstetric trauma from uncontrolled perineal tears. The benefits and risks of episiotomy as a means of avoiding more severe damage to the perineum and possible cranial trauma to the neonate, are still matters of research and debate. Perineal tears or wounds, whether traumatic or surgical, are associated with a variety of adverse outcomes, including pain, oedema, infection and sexual dysfunction (Renfrew, Hannah, Albers, & Floyd, 1998).

A Cochrane Review found that research evidence supports restrictive use of episiotomy (Carroli, Belizan, & Stamp, 1999). A systematic review of randomised control trials of routine episiotomy found no evidence that the practice helped women avoid severe tears, improved long-term sexual function, or helped childbirth-related incontinence (Hartmann *et al*., 2005). These authors indicate that episiotomies are medically warranted in fewer than 10 per cent of cases. Severe perineal tears involve injury to the anal sphincter muscles (3rd degree) and breach of the rectal mucosa (4th degree). Episiotomy is not protective against severe tears, because more than 50 per cent of women who sustain a 3rd- or 4th-degree tear have had an episiotomy (Hartmann, *et al*., 2005). The data presented in these charts is for local health district (LHD) of usual residence of the mother.

Findings: In 2009, 27 per cent of all vaginal first births in NSW involved an episiotomy. There is substantial variation in rates between LHDs, ranging from 17.7 per cent in Central Coast to 32.6 per cent in South Western Sydney. It is noted that the LHDs with highest episiotomy rates had the lowest caesarean section rates and vice versa.

The percentage of vaginal first births with significant tears (3rd or 4th degree) was 4.5 per cent across NSW in 2009, compared to 3.5 per cent in 2005. Across LHDs in 2009, the rate of 3rd- and 4th-degree tears ranged from 2.9 in Illawarra Shoalhaven to 5.8 per cent in Mid North Coast.

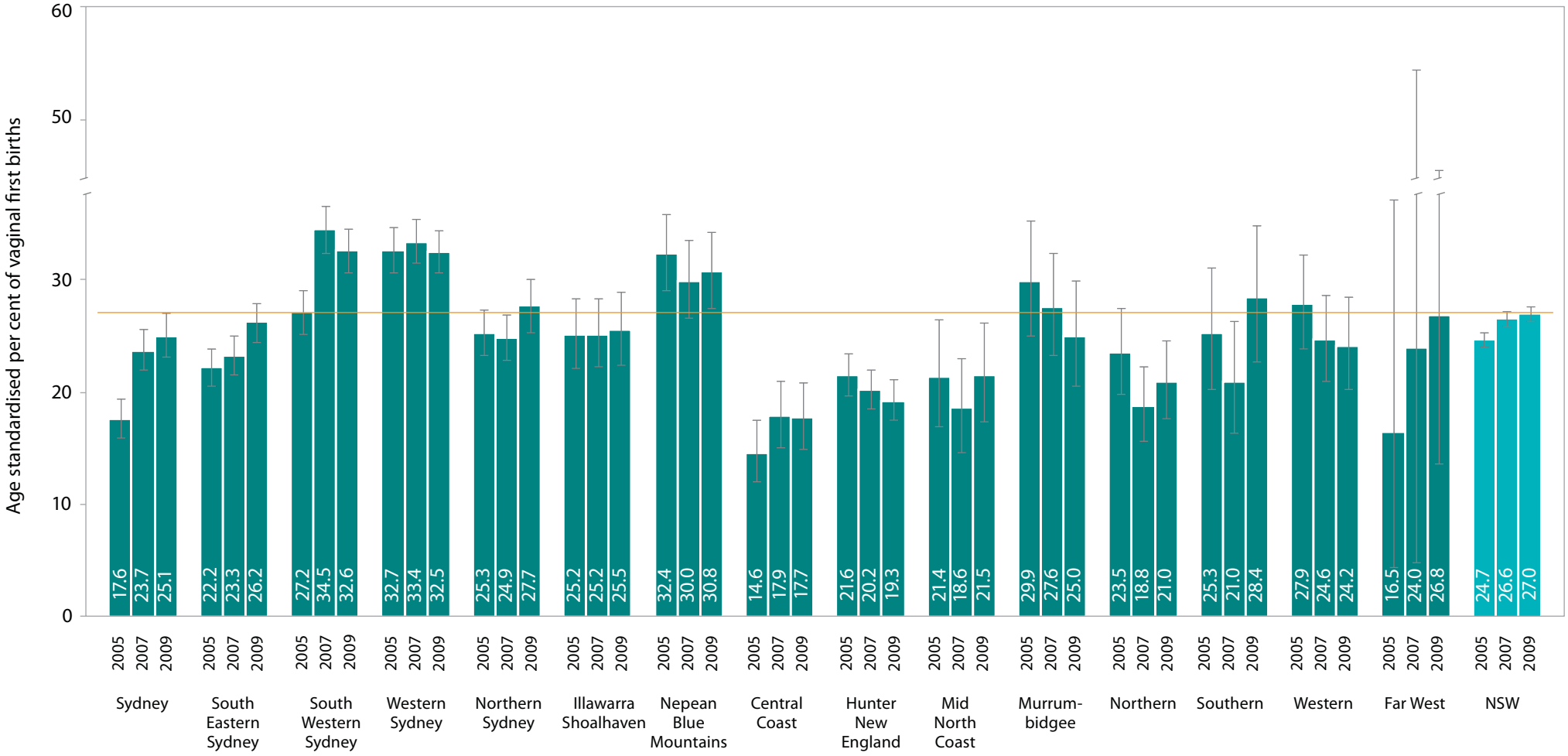
Implications: Variation in the prevalence of episiotomies between LHDs is of concern. Examination of rates, by type of delivery and hospital, indicates significantly higher forceps delivery rates in private hospitals, a major contributing factor in the higher episiotomy rates in some regions. Dahlen and Homer found that ethnicity is a contributing factor. Data from two Sydney maternity hospitals found that, compared with other races, Asian women were significantly more likely to have an episiotomy, require perineal suturing and sustain a 3rd- or 4th-degree perineal tear (Dahlen & Homer, 2008). Compared to NSW, the rate is substantially lower in countries such as Sweden, (9.7 per cent) (Hartmann, *et al*., 2005).

What we don't know: Why do episiotomy rates in NSW continue to increase, despite the evidence supporting more restrictive use?

Episiotomy rates

Chart 9-5

Percentage of episiotomies for women having their first baby vaginally by local health district of usual residence, 2005-2009

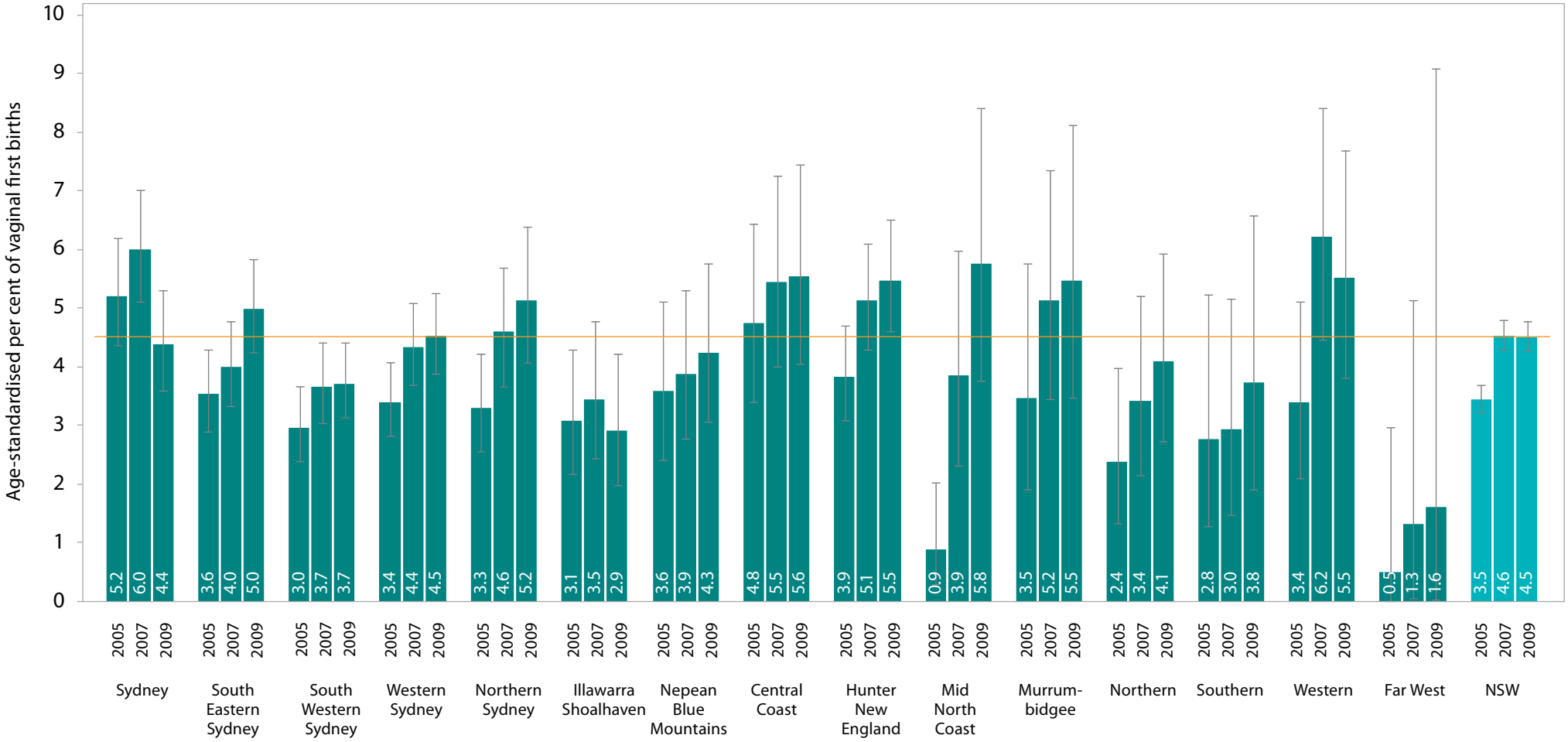


Source: NSW Midwives Data Collection (HOIST). Centre for Epidemiology and Research, NSW Ministry of Health.

Obstetric trauma

Chart 9-6

Percentage of births with 3rd- and 4th-degree tears for women having their first baby vaginally by local health district of usual residence, 2005-2009

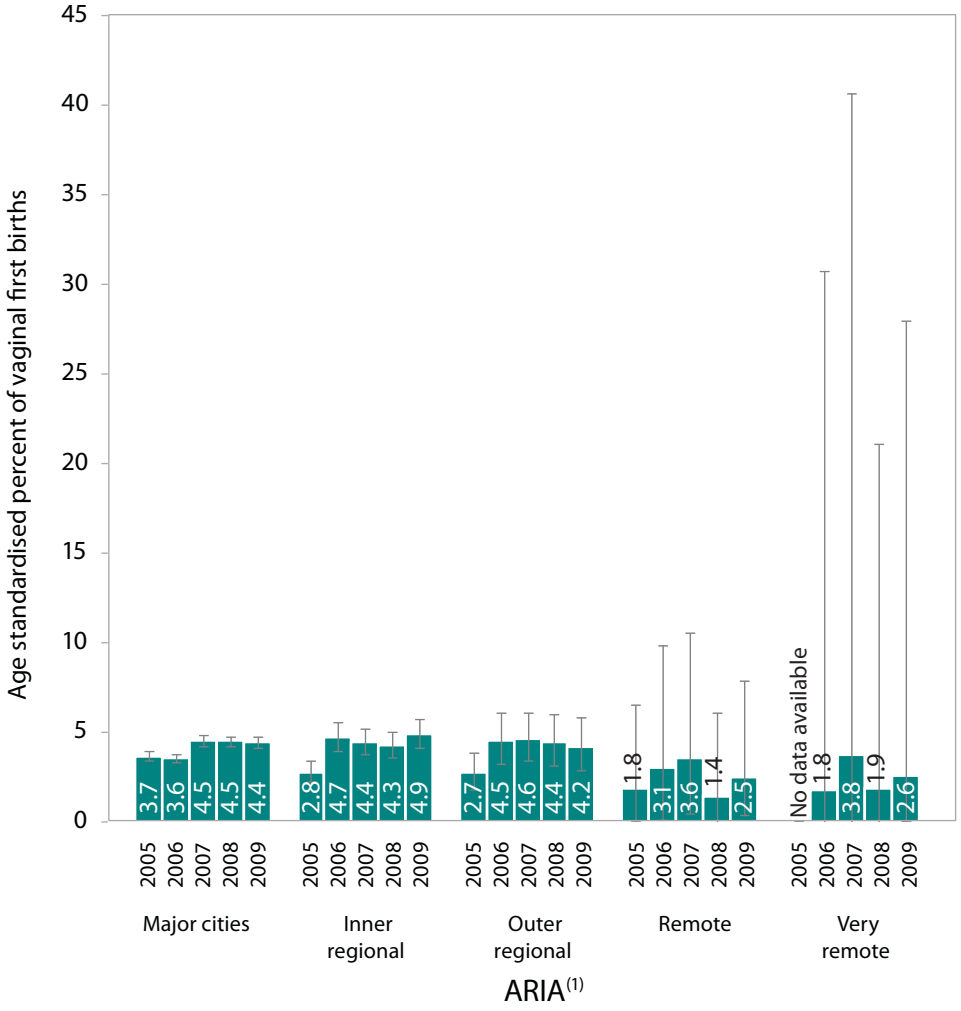


Source: NSW Midwives Data Collection (HOIST). Centre for Epidemiology and Research, NSW Ministry of Health.

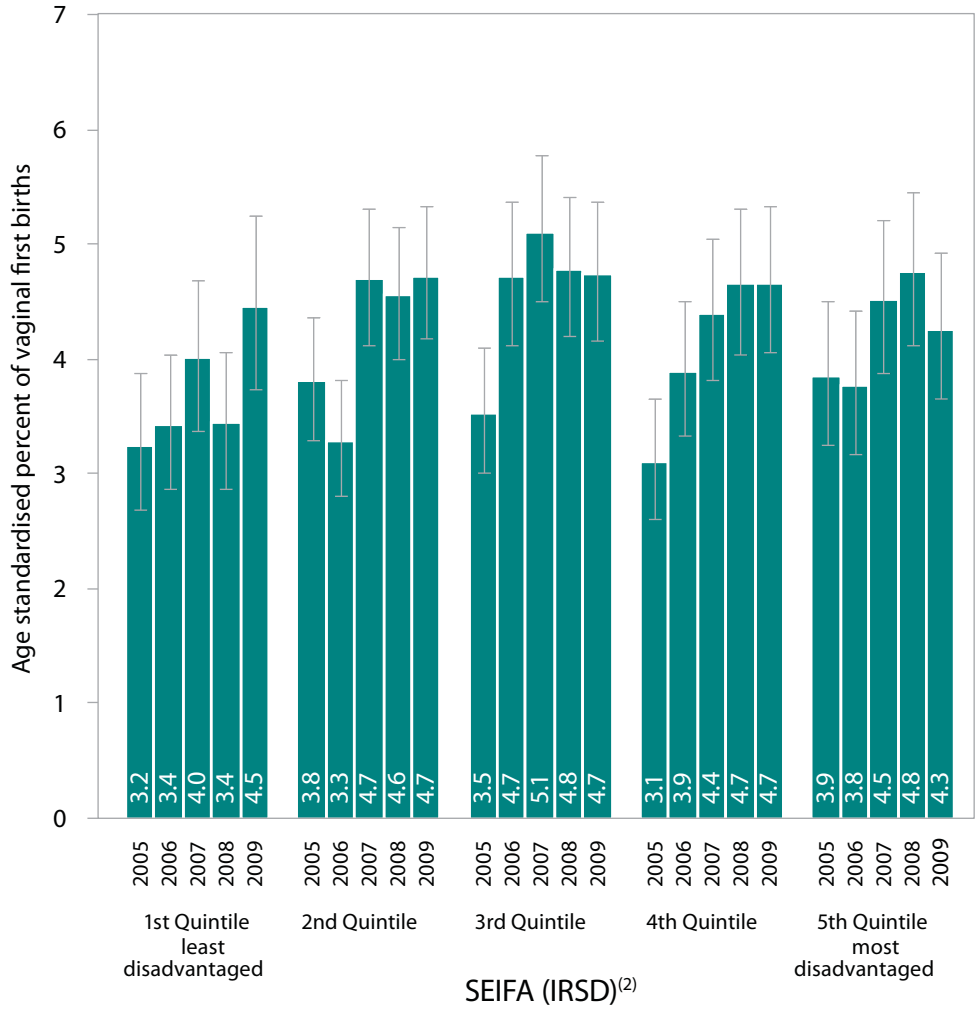
Obstetric trauma by ARIA[(1)] and SEIFA (IRSD)[(2)]

Chart 9-7

Percentage of births with 3rd- and 4th-degree tears for women having their first baby vaginally by remoteness region 2005-2009



Percentage of births with 3rd and 4th degree tears for women having their first baby vaginally by socio-economic status quintile (Index of relative socio-economic disadvantage), 2005-2009



Source: NSW Midwives Data Collection (HOIST). Centre for Epidemiology and Research, NSW Ministry of Health.
(1) Accessibility/Remoteness Index of Australia, ABS 1216.0 (2006).
(2) Socio-economic Indices for Areas (Index of Relative Socio-economic Disadvantage) ABS 2039.0 (2008).

Why is this important? Spontaneous unassisted vaginal deliveries are regarded as 'normal' and are the most common form of management of labour for low-risk births. Measurement of the percentage of normal to other births, particularly for selected primipara - women aged 20 to 34 years, with no previous pregnancy ≥20 weeks gestation, of a single pregnancy, with a cephalic (head-first) presentation and an estimated gestational age of 37 to 41 weeks (ACHS, 2010) is often used as an indicator of safety and quality of maternity care, because of the absence of interventions that increase risk to mother and baby. When deliveries do require assistance, the goal is to imitate spontaneous vaginal birth, thereby expediting delivery, with a minimum of maternal or neonatal morbidity. Assisted vaginal births are those where either forceps and/or vacuum extraction are used and those augmented by induction or drugs to promote contractions and births, assisted by epidural anaesthesia. A recent NSW study has highlighted the steep increase in inductions for first-time mothers as a proportion of all births, from 6.8 in 1990 to 12.5 per cent in 2008 (Patterson, Roberts, Ford, & Morris, 2011). There is an increasing recognition that unnecessary intervention in the natural process may disturb the expected course and may lead to a cascade of intervention. This is reflected in the policy *Maternity-Towards Normal Birth in NSW* (NSWDOH, 2010c).

Normal births reduce the risk of trauma, including tears and genital tract trauma, relating to forceps and the vacuum extractor (RCOG, 2005). Women having normal births also report better sexual, bowel and urinary functioning than women with assisted vaginal deliveries (Lydon-Rochelle, Holt, & Martin, 2001). Assisted deliveries have a greater association with infant external ocular injuries and facial nerve palsies, an increase in mild scalp lacerations, cephalhematoma and/or retinal haemorrhage.

The data presented in the following charts is for local health district (LHD) of usual residence of the mother.

Findings: In NSW, for selected primipara births in 2009 (women aged 20 to 34 years, having their first birth, singleton pregnancy, cephalic presentation and estimated gestational age of 37 to 41 weeks), excluding augmented and instrumental births, 34.3 per cent were normal. The rate of unassisted vaginal deliveries has remained steady at around 34 per cent over the past five years. Rates ranged across LHDs from 29.7 per cent in Illawarra Shoalhaven to 47 per cent in Far West.

Implications: NSW has high rates of both induction and caesarean section following induction (Mealing, Roberts, Ford, Simpson, & Morris, 2009). The philosophy underpinning primary maternity services is that birth is a normal, but significant, physiological event and that woman have different needs in relation to pregnancy and childbirth. Maternity services should ensure that women are able to make informed and timely choices regarding their maternity care and feel in control of the birthing experience. Because operative vaginal delivery can be associated with maternal and neonatal morbidity, strategies that reduce the risk of operative vaginal delivery should be used. There is strong evidence which demonstrates that continuity of midwifery care in pregnancy, birth and the postnatal period, is as safe as traditional models of care and can result in positive outcomes, including reduced interventions in labour, reduced caesarean section rates and reduced need for neonatal resuscitation at birth (AHMAC, 2008).

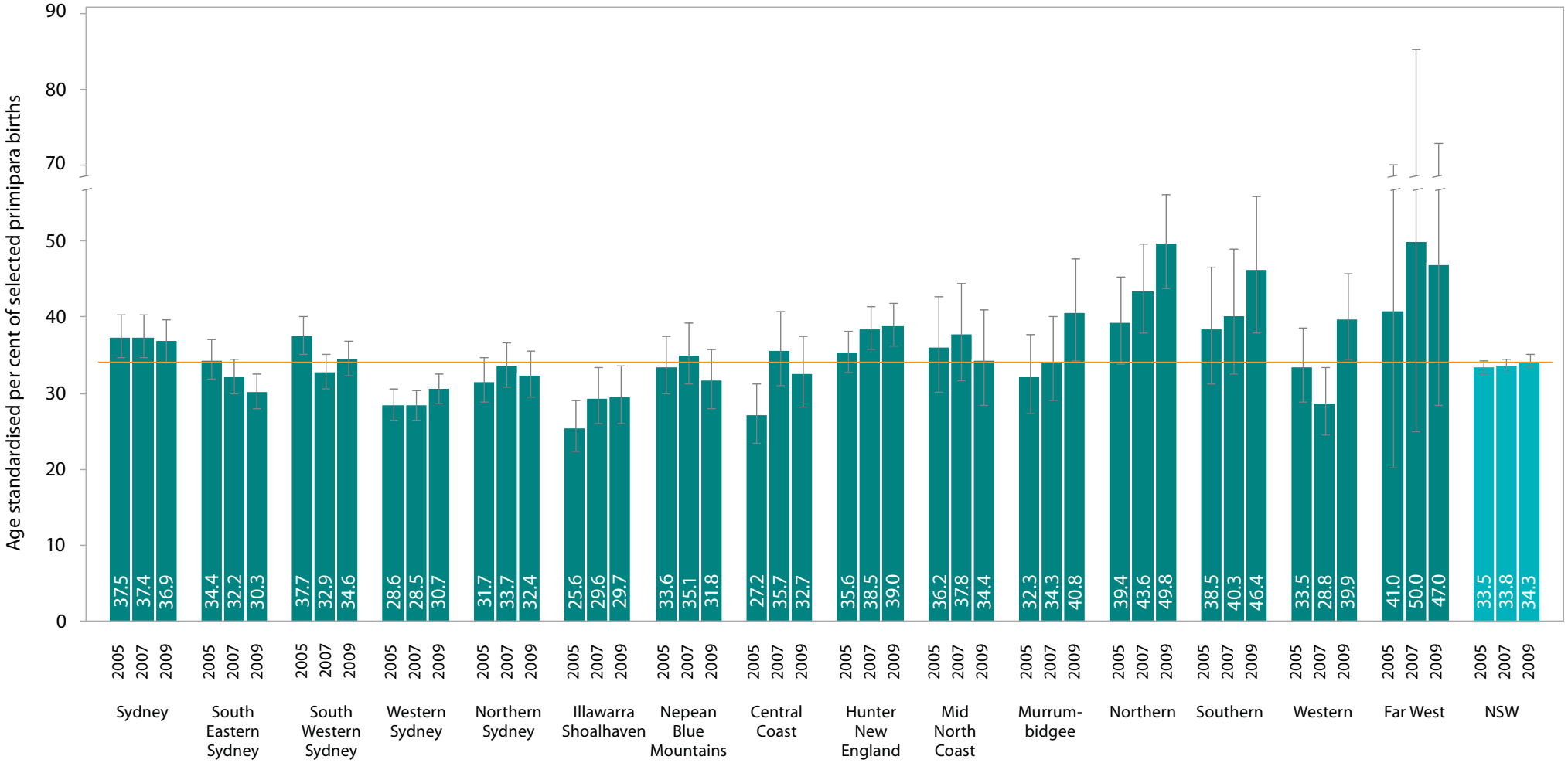
System analysis often reveals inadequate training as a key contributor to adverse outcomes and that training is central to patient safety initiatives (Murphy, Liebling, Patel, Verity, & Swingler, 2003).

What we don't know: What is the effect of labour induction on the outcomes of subsequent pregnancies?

Unassisted vaginal deliveries

Chart 9-8

Percentage of spontaneous vaginal birth without epidural for selected primipara by local health district of usual residence 2005-2009



Source: NSW Midwives Data Collection (HOIST). Centre for Epidemiology and Research, NSW Ministry of Health.

Why is this important? This indicator is a measure of the outcome of labour and caesarean births, elective or emergency, with particular emphasis on the assessment of baby well-being. The Apgar score is the assessment of a newborn baby's physical condition, based on skin colour, heart rate, response to stimulation, muscle tone and respiratory effort. It is a numerical expression of the physical condition of an infant shortly after delivery. Each criterion is rated from zero to two, with a total score of 10 signifying the best possible physical condition. The assessment determines the need for immediate emergency treatment, helps prevent unnecessary emergency intervention and indicates possible brain damage. The Apgar score does not check for all possible complications (such as chromosomal damage), therefore a high number does not guarantee that a child's long-term outlook is completely positive. An Apgar score of less than, or equal to, six at five minutes of age indicates poor infant well-being.

The population risk of adverse perinatal outcomes is extremely small, regardless of the place of birth. Women at high risk of adverse outcomes should be (and are being) cared for in tertiary public hospitals, which, unlike private hospitals, are designed to provide high-level care (Robson, Laws, & Sullivan, 2009). Compared with public hospitals, birth in Australian private hospitals is characterised by a higher rate of obstetric interventions, such as induction of labour, episiotomy, instrumental delivery and caesarean section. The authors found that term babies born in public hospitals were more likely to require high levels of resuscitation, to have an Apgar score less than 7 at five minutes and to require admission to a neonatal intensive care facility or special care nursery. It should be noted that one of the limitations of this study is that they were not able to control for the presence of co-morbidities or socio-economic disadvantage in each group - factors with significant impact on perinatal outcomes (Sutherland, Gartland, Yelland, & Brown, 2009; Watson, Davey, Biro, & King, 2009). Women from socio-economically disadvantaged groups are over-represented in the public hospital population. Furthermore, complex cases are often transferred to large public hospitals, causing an impact on rates.

Findings: Across NSW, the rate of live term infants with an Apgar score of less than, or equal to six (i.e., poor infant well-being) at five minutes was 1.5 per cent in 2009. The rate changed very little between 2005 and 2009. In 2009, rates ranged across LHDs from 0.6 per cent in Southern NSW, to 2.2 per cent in Central Coast. Much of this variation in rates between LHDs was not statistically significant. The data is based on the definition from the *National Core Maternity Indicators*, although not with the exclusion of infants with major congenital malformations. This analysis was not possible with data from the Midwives Data Collection.

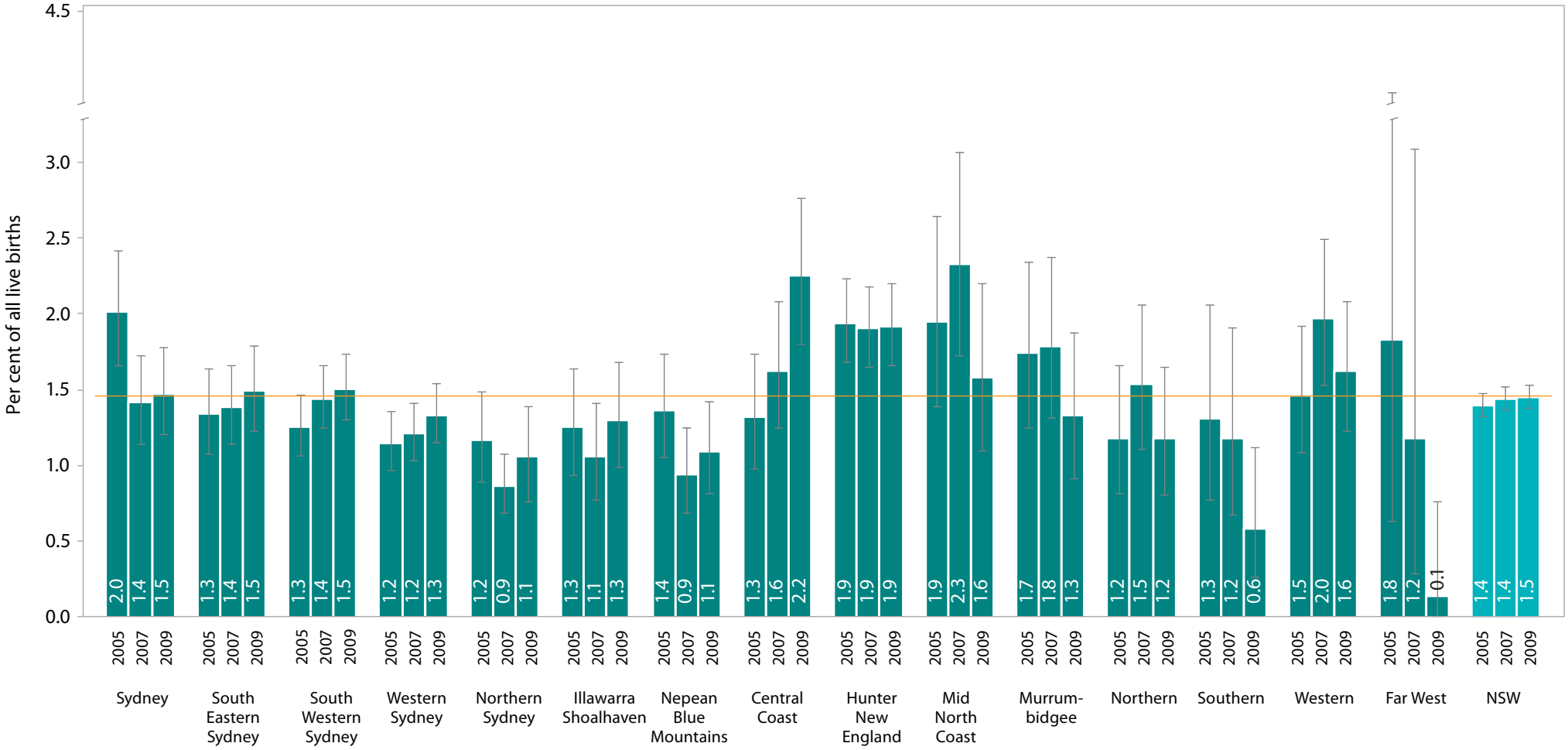
Implications: Low Apgar scores remained stable between LHDs and for NSW over the last five years.

What we don't know: Are adverse perinatal outcomes higher in public or private hospital settings, after adjusting for differences in the two very different populations utilising these settings?

Infant well-being

Chart 9-9

Percentage of live term infants with an Apgar score of less than, or equal to 6 at 5 minutes by local health district of usual residence, 2005-2009



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Episiotomy rates and obstetric trauma (3rd and 4th degree perineal tears) for first births

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Impact: Specialist neonatal services provide perinatal advice and consultation, as well as inpatient care for neonates who are born with, or develop additional needs after birth. This includes pre-term and low birth weight babies, as well as any baby requiring secondary or tertiary neonatal care. In 2009, there were 2,517 babies born to mothers usually resident in NSW, who met the neonatal intensive care units' (NICUS) registration criteria and were admitted to neonatal intensive care units, a rate of 26.6 per 1000 live births (CER, 2011b). The NICUS data collection was established in 1985, to document the outcome of high-risk babies who were admitted to a NICU in NSW (NSWDOH, 1990). The registration criteria, data collected and participating hospitals, have changed over the past two decades.

Risk factors: The current registration criteria for neonatal intensive care units or level 4 special care nurseries include babies who are:

- Born at less than 32 weeks gestation and/or
- Born weighing less than, or equal to, 1500 grams and/or
- Require mechanical ventilation for four hours or more during the first 28 days of life and/or
- Require continuous positive airways pressure for four hours or more during the first 28 days of life and/or
- Require major surgery (opening of a body cavity) during the first 28 days of life and/or
- Require a central line for four hours or more during the first 28 days of life and/or
- Require hypothermia for neonatal encephalopathy during the first six hours of life and/or
- Require nasal high-flow gas delivered with humidification through a device for four hours or more during the first 28 days of life.

Babies are registered in one category only, in descending order. For example, a baby born at 29 weeks, requiring mechanical ventilation, is registered as a baby born less than 32 weeks gestation.

NICU services: The ten neonatal intensive care units in NSW and the Australian Capital Territory (ACT), as well as five of the level 4 special care nurseries in NSW, contribute data to NICUS. This includes the neonatal intensive care units at the two co-located children's hospitals and the children's hospital located within a perinatal centre. The information in this report for babies registered to the Canberra Hospital in the ACT, pertains only to those who were born to NSW residents.

Wherever possible, high-risk babies are cared for in the closest perinatal centre to the place of usual residence of the mother. There are, however, occasions when the closest perinatal centre with an available neonatal intensive care cot is not in the local health district of the mother's usual residence. This situation typically occurs when babies require surgery, for rural babies and in times of bed shortages. As neonatal intensive care is a Statewide service, babies are transported by the Neonatal and paediatric Emergency Transport Service (NETS) to the closest perinatal centre with an available cot appropriate for the baby's condition.

It is important to monitor and evaluate the perinatal mortality, morbidities and long-term outcome of this group of high-risk babies.

Why is this important? High-risk babies who are admitted to a neonatal intensive care unit (NICU) or a level 4 special care nursery, have a higher morbidity and mortality rate than babies who do not require such care after birth. They consume a higher proportion of health resources, some on an ongoing basis. It is important to know where mothers of high-risk babies reside for planning of healthcare services, both acute and long-term, and to ensure equity of access to health services.

Findings: In 2009, 2,517 babies meeting NICUS registration criteria and born alive to a mother who was usually resident in NSW at the time of her baby's birth, were admitted to a NICU or a level 4 special care nursery in NSW or the Australian Capital Territory (ACT). These represented 2.7 per cent of all live births. The rate of NICUS registrations has increased from 2.4 per cent in 2005.

NICUS registrants as a percentage of live births were significantly higher in Southern NSW and Hunter New England and lower in Northern NSW. The higher rate in Hunter New England may represent a difference in clinical practice in the use of continuous positive airway pressure (CPAP). The rate in Northern NSW and Far West should be interpreted with caution, because high-risk babies whose mothers live in border towns are appropriately admitted to NICUs or level 4 special care nurseries in Queensland or South Australia, respectively. It should be noted that babies born in Southern NSW, Western NSW and some areas of South Western Sydney, are preferentially cared for in the NICU of the Canberra Hospital in the ACT.

Implications: This indicator is an important measure of where mothers whose babies meet the NICUS registration criteria live. It is reassuring to note that there seems to be reasonable equity of access to neonatal intensive care units throughout the period. This makes it easier for parents to visit their babies during their sometimes protracted hospitalisations.

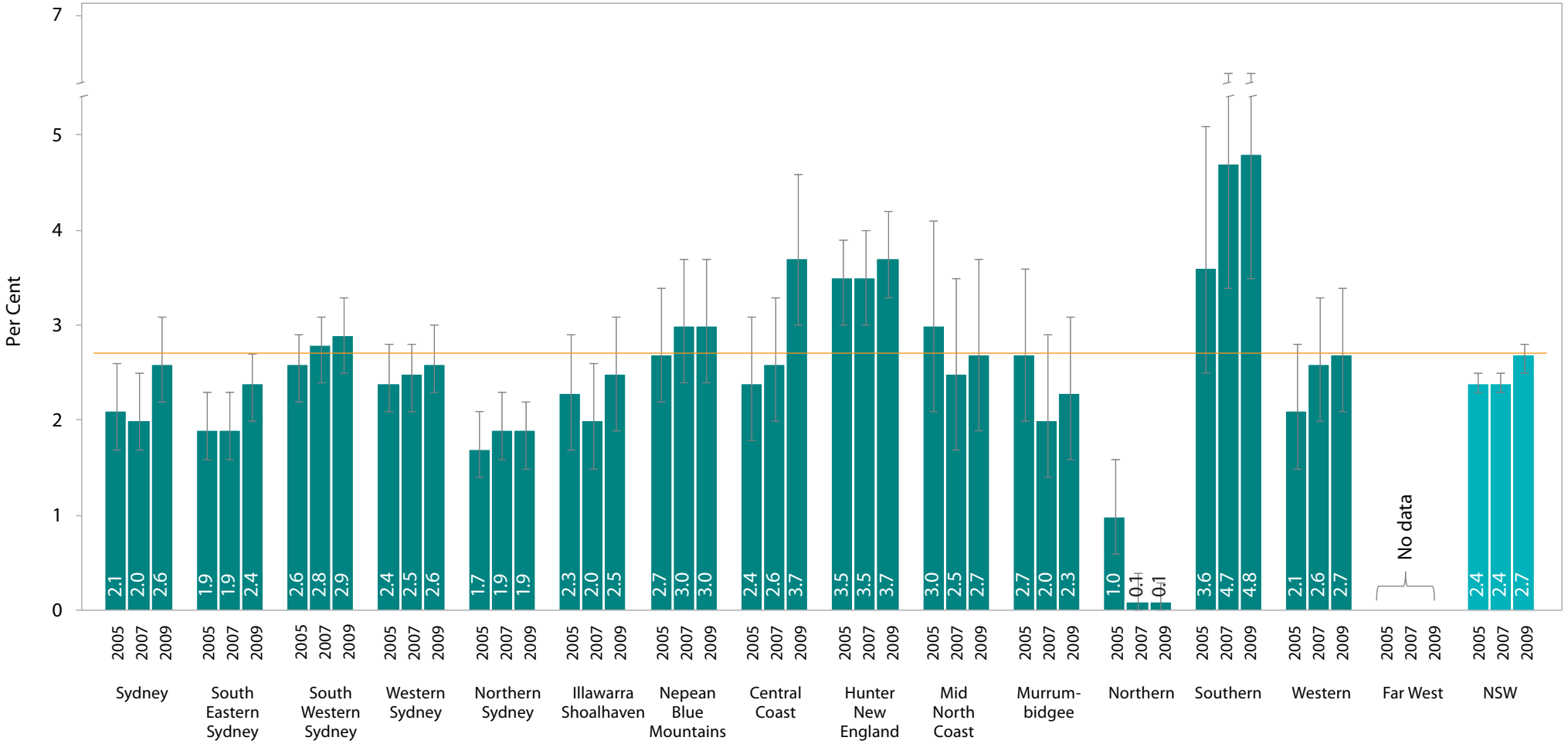
What we don't know: Why is there such variance in the rate of NICUS registrants between LHDs?

What is the reason for the increase in the rate of newborns being admitted to NICUs or level 4 special care nurseries?

Neonatal intensive care units' (NICUS) registrants

Chart 10-1

Percentage of all live births admitted to neonatal intensive care unit who are NICUS registrants by local health district of usual residence, 2005-2009



Source: NICUS Data Collection, NSW Pregnancy and Newborn Services Network.

Why is this important? The survival rate of patients admitted to neonatal intensive care units (NICUs) is generally regarded as a primary outcome measure for that unit and of the overall success of the program. Studies have reported that due to advancements of technological and medical treatment in the last three decades, the survival of extremely pre-term and low birth weight infants has increased significantly (Chan *et al*., 2001; Field, Dorling, Manktelow, & Draper, 2008; Fischer, Steurer, Adams, & Berger, 2009; Horbar *et al*., 2002; Keogh *et al*., 2007; Markestad *et al*., 2005; Meadow, Lee, Lin, & Lantos, 2004; Wood, Marlow, Costeloe, Gibson, & Wilkinson, 2000). It is therefore important to examine the survival rate of newborn babies admitted to NSW neonatal intensive care units (NICUs), to ensure that these survival rates are acceptable and that there is no inequity in mortality across local health districts (LHDs). The data is presented by LHD of usual residence of the mother.

Findings: Overall in NSW in 2009, 92.6 per cent of babies born at less than 32 weeks gestation survived to hospital discharge. The rate has increased from 88.7 per cent in 2005. Survival within different LHDs fell within a narrow range - from 87.5 to 98.3 per cent. The variation in rates for NICUs registrants is within the range of normal variance for most LHDs.

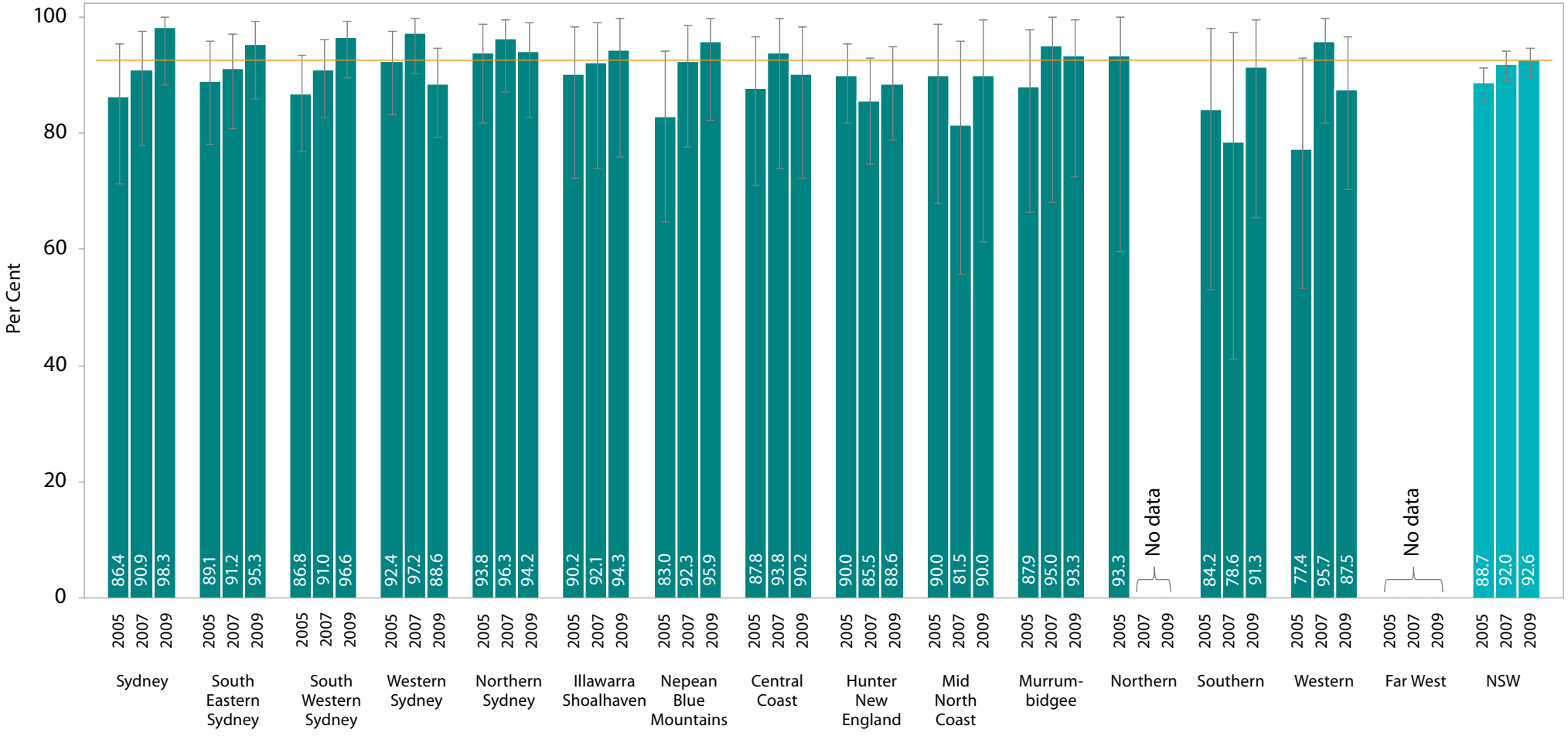
The survival rate for babies born to mothers usually residing in an LHD near NSW borders should be interpreted with caution, because these babies are admitted to neonatal intensive care units in ACT, Queensland, South Australia or Victoria, where appropriate.

Implications: The overall survival rate of NICUs registrants is re-assuring, with only minimal significant differences across local health districts. They compare favourably with the survival rates for paediatric and adult intensive care units.

Survival of NICUS registrants born at less than 32 weeks

Chart 10-2

Percentage of survival to hospital discharge of NICUS registrants (born at < 32 weeks of gestation) by local health district of usual residence, 2005-2009



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OTHER ACUTE SERVICES | Introduction

Chapter 11

Impact: This chapter presents a range of indicators related to the appropriateness, access, efficiency and consumer participation dimensions of quality.

The indicators selected for *Chartbook 2010* are:

- Hysterectomy rates in non-cancer cases (women aged 15-34, women aged 35-69)
- Myringotomy rates (persons under 15 years)
- Cataract and lens procedure rates
- Waiting for elective (booked) treatment
- Day-of-surgery admission and day-only surgery

Variations between local health districts in hospitalisation rates for hysterectomy and myringotomy suggest there are important questions to be considered in the appropriateness of current rates of use, particularly for populations in some regions of NSW. Variations in hospitalisation rates for cataract and lens procedures suggest that there are questions relevant for the appropriateness, access and efficiency dimensions of quality. The indicators of waiting times for booked treatment are mainly relevant to questions of access.

Two indicators related to the efficiency dimension are presented: - day-of-surgery admission and day-only surgery rates.

These indicators provide valuable insight into the patient experience.

Why is this important? Hysterectomy is the total removal of the uterus, or much less commonly, its partial removal. The procedure can be used to treat a range of conditions, including menorrhagia (heavy menstrual bleeding), chronic pelvic pain and uterine fibroids. Hysterectomies are also used in the treatment of uterine cancer - either cancer of the body of the uterus or cancer of the cervix. In recent years the number of women undergoing a hysterectomy has declined. While there is no nationally agreed appropriate rate, there have been concerns that hysterectomies may be overused in non-cancer cases. Ineffective treatment of heavy menstrual bleeding is likely to lead to a referral and a high chance of hysterectomy (Nixon, Duffy, Fender, Day, & Prevost, 2001). There is evidence from randomised controlled trials (RCTs) that modern medical and conservative surgical therapies (including endometrial ablation) are effective treatments for heavy menstrual bleeding (menorrhagia) for many women (Hickey & Farquhar, 2003). Data refers to the patient's local health district of residence. It excludes women with a cancer diagnosis. Data is stratified into two age groups: 15-34 years and 35-69 years, based on conforming with national indicators and comparability with data in previous Chartbooks.

Findings: In 2009, 297 NSW women aged between 15 and 34 years had a hysterectomy procedure, compared with 507 in 2005. Age-standardised rates fell from 53 procedures per 100,000 women in 2005 to 31.5 in 2009. Around 69 per cent of hysterectomies in the 15-34 age group are performed in public hospitals. Hysterectomy rates for women aged 15 to 34 years are closely correlated with socio-economic status. Age-standardised rates for the lowest quintile were 57.3 per 100,000 women, being seven times greater than for women in the highest quintile (11.3 per 100,000). Across local health districts, rates in 2009 ranged from 4.5 hysterectomies per 100,000 women aged 15-34 years in Northern Sydney to 147 in Western NSW. Over the period 2005-2009, rates were lower in major cities compared to the rest of the State. Age-standardised rates for major city regions are 29 per 100,000, women aged 15-34, compared with around 100 for inner and outer regional locations and around 50 for remote and very remote locations.

In the 35-69 age group, 6,170 women had a hysterectomy procedure in 2009, compared to 7,230 in 2005. Age-standardised rates decreased from 503 per 100,000 women in 2005 to 408 in 2009. Variations between local health districts in hysterectomy rates for women aged 35 to 69 years are statistically significant, particularly for Southern NSW.

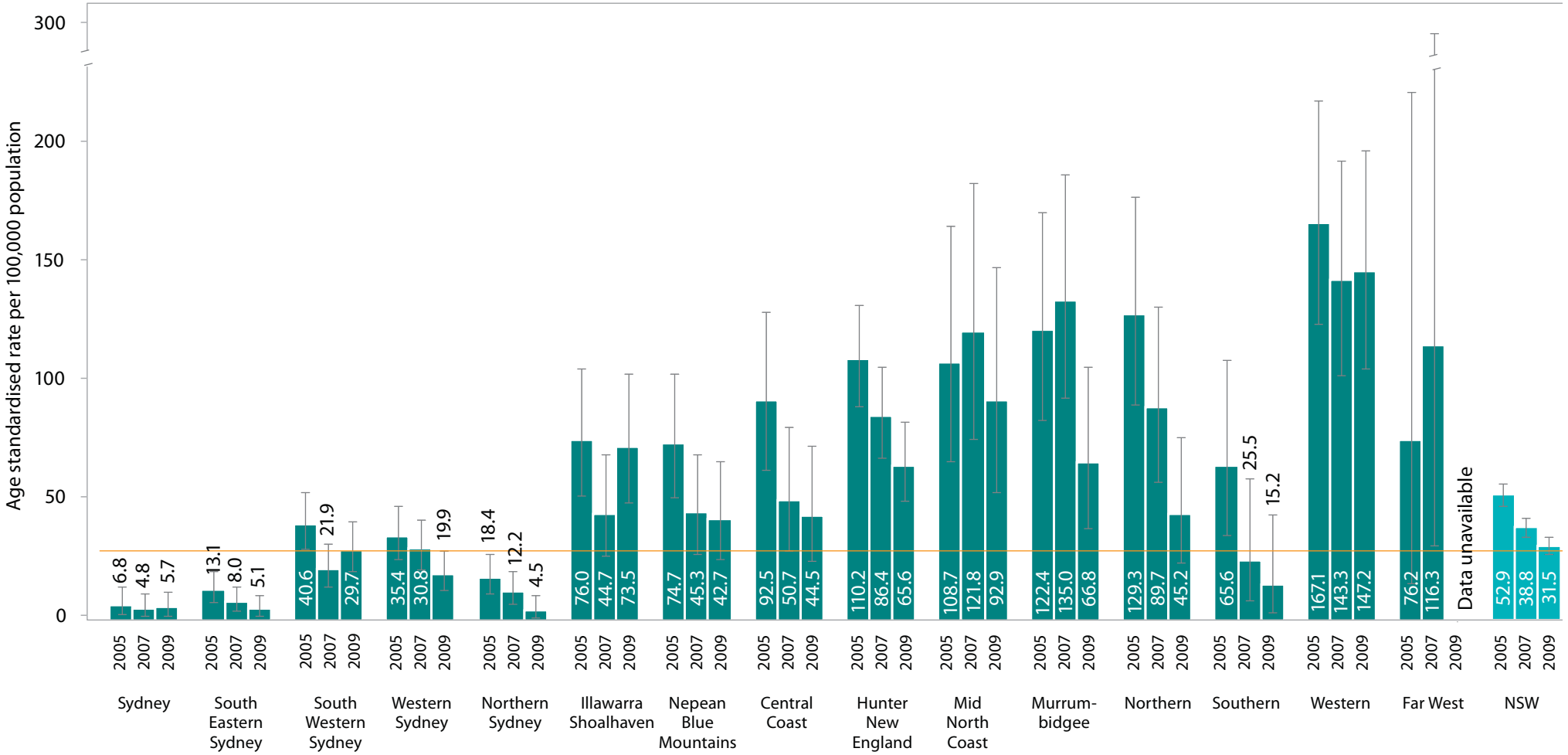
Implications: In line with the trend seen in many developed healthcare systems around the world, there has been a significant decline in hysterectomy rates across NSW in the last five years. This may be a result of initiatives to address inappropriately high rates, improved provision of information and evidence-based advice for women, or availability of other non-surgical options. Significant variations in the use of the procedure persist, however, reflecting higher rates for women living in rural populations and more disadvantaged regions. While some of this may reflect patient choice, it suggests that hysterectomy may be overused for women living in many parts of NSW. Further analysis, investigation and strategies are required, particularly to ensure that women are well informed and can access appropriate options wherever they live.

What we don't know: Why do hysterectomy rates for non-cancer cases remain significantly higher in non-metropolitan areas?

Hysterectomy rates for women aged 15 to 34 years

Chart 11-1

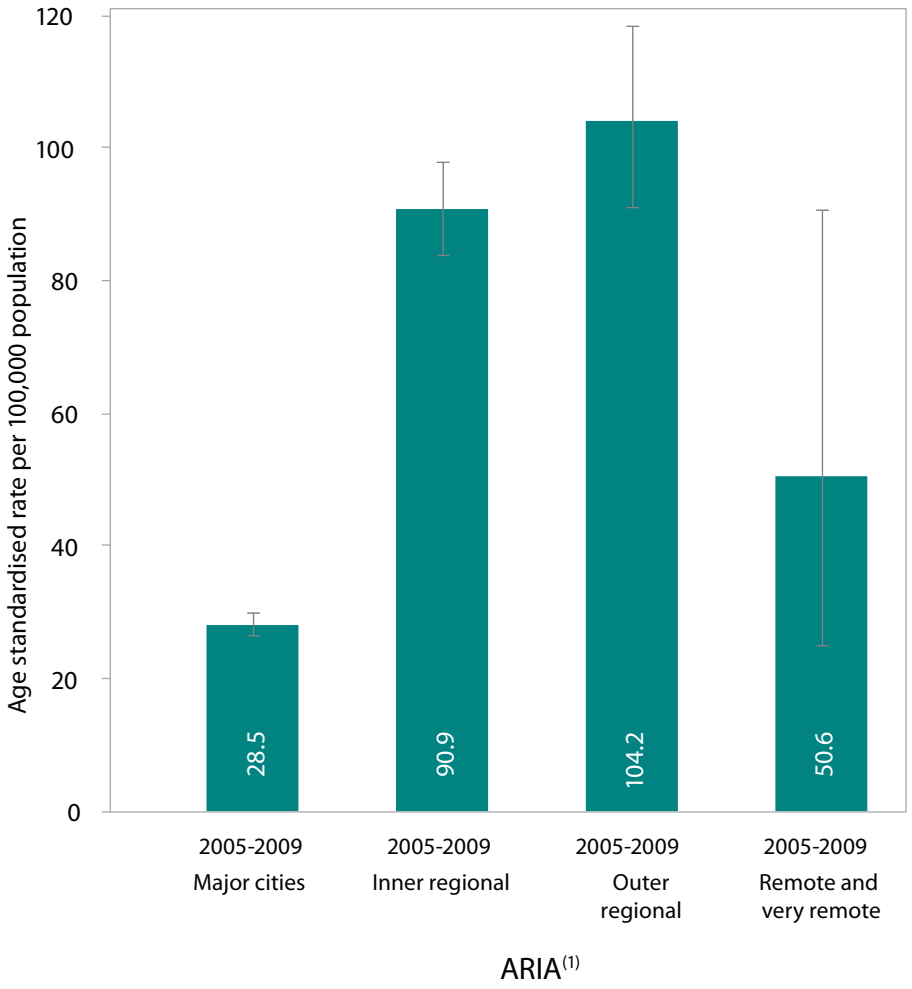
Hysterectomy rate per 100,000 women aged 15 to 34 years (excluding cancer) by local health district of usual residence, 2005-2009



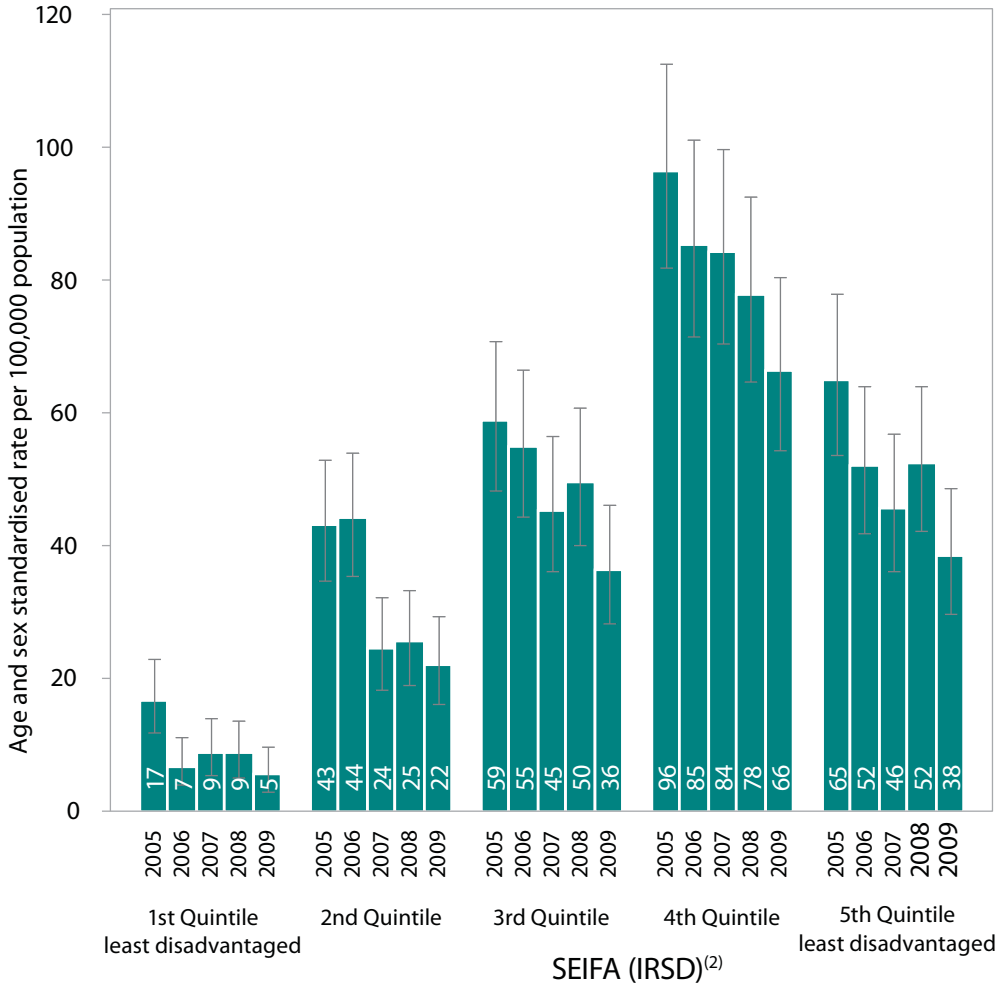
Source: NSW Admitted Patient Data Collection and ABS population estimates (HOIST), Centre for Epidemiology and Research, NSW Ministry of Health

Hysterectomy rates for women aged 15-34 years by ARIA[(1)] and SEIFA (IRSD)[(2)] Chart 11-2

Hysterectomy rates per 100,000 women aged 15-34 years by combined remoteness region, 2005-2009



Hysterectomy rates per 100,000 women aged 15-34 years by socio-economic status quintile (Index of relative socio-economic disadvantage), 2005-2009

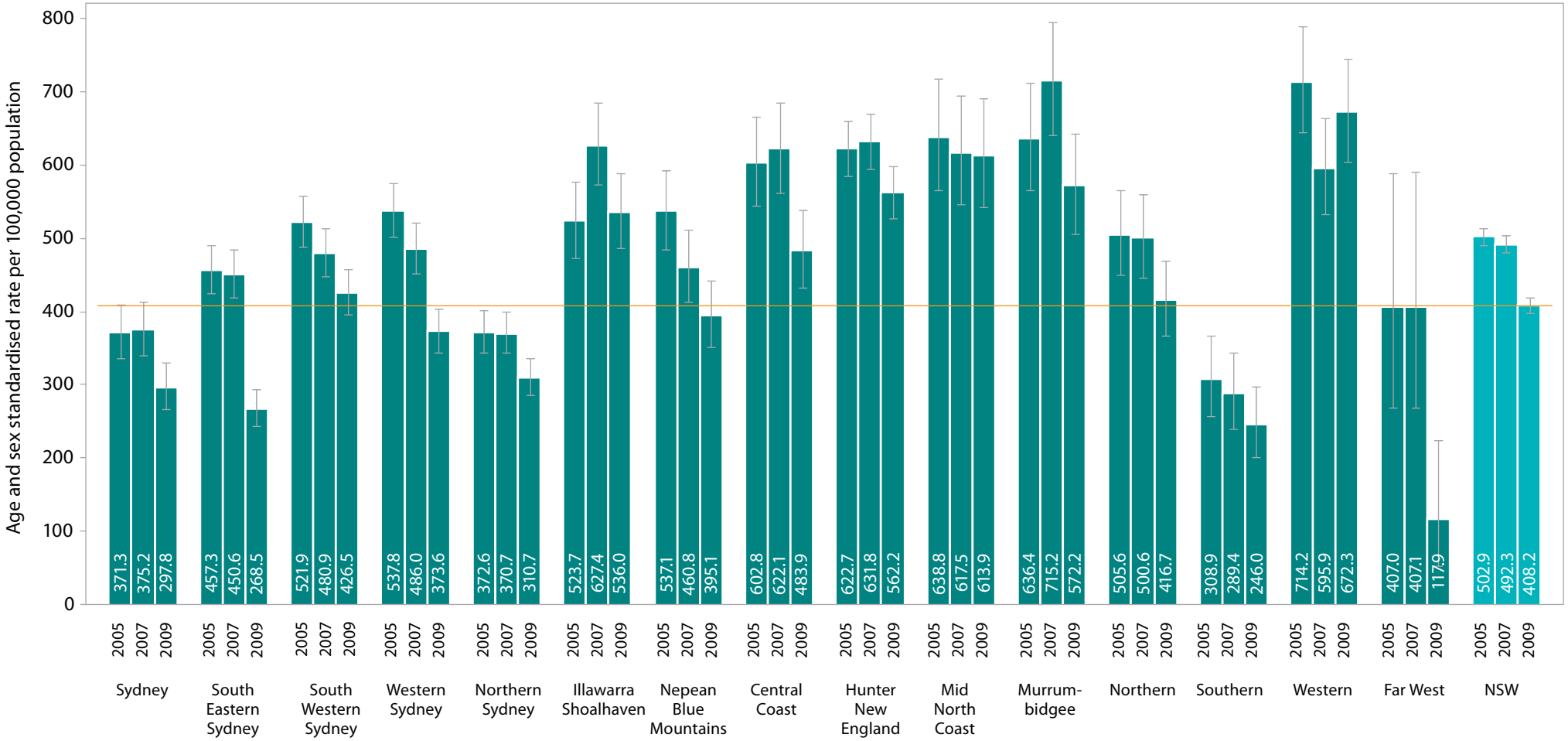


Source: NSW Admitted Patient Data Collection and ABS population estimates (HOIST), Centre for Epidemiology and Research, NSW Ministry of Health.
(1) Accessibility/Remoteness Index of Australia, ABS 1216.0 (2006)
(2) Socio-economic Indices for Areas (Index of Relative Socio-economic Disadvantage) ABS 2039.0 (2008)

Hysterectomy rates for women aged 35 to 69 years

Chart 11-3

Hysterectomy rates per 100,000 women aged 35-69 years by local health district of usual residence, 2005-2009

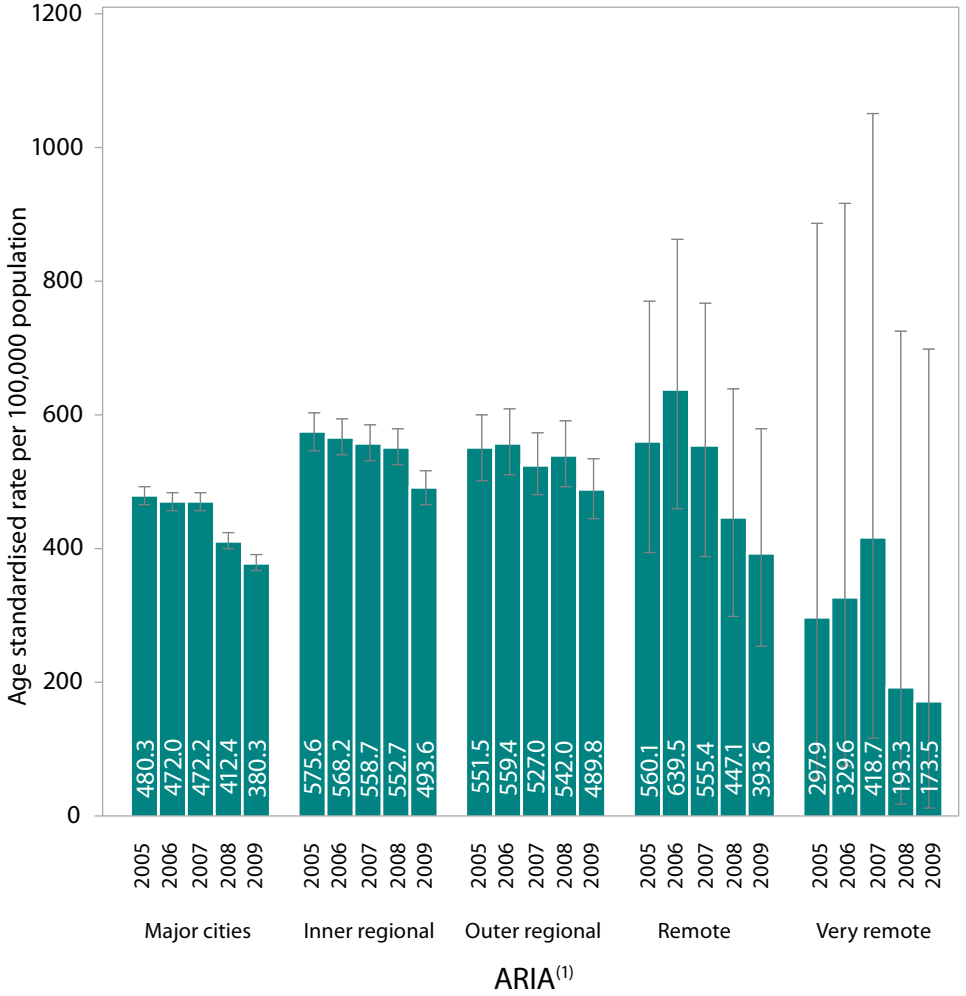


Source: NSW Admitted Patient Data Collection and ABS population estimates (HOIST), Centre for Epidemiology and Research, NSW Ministry of Health.

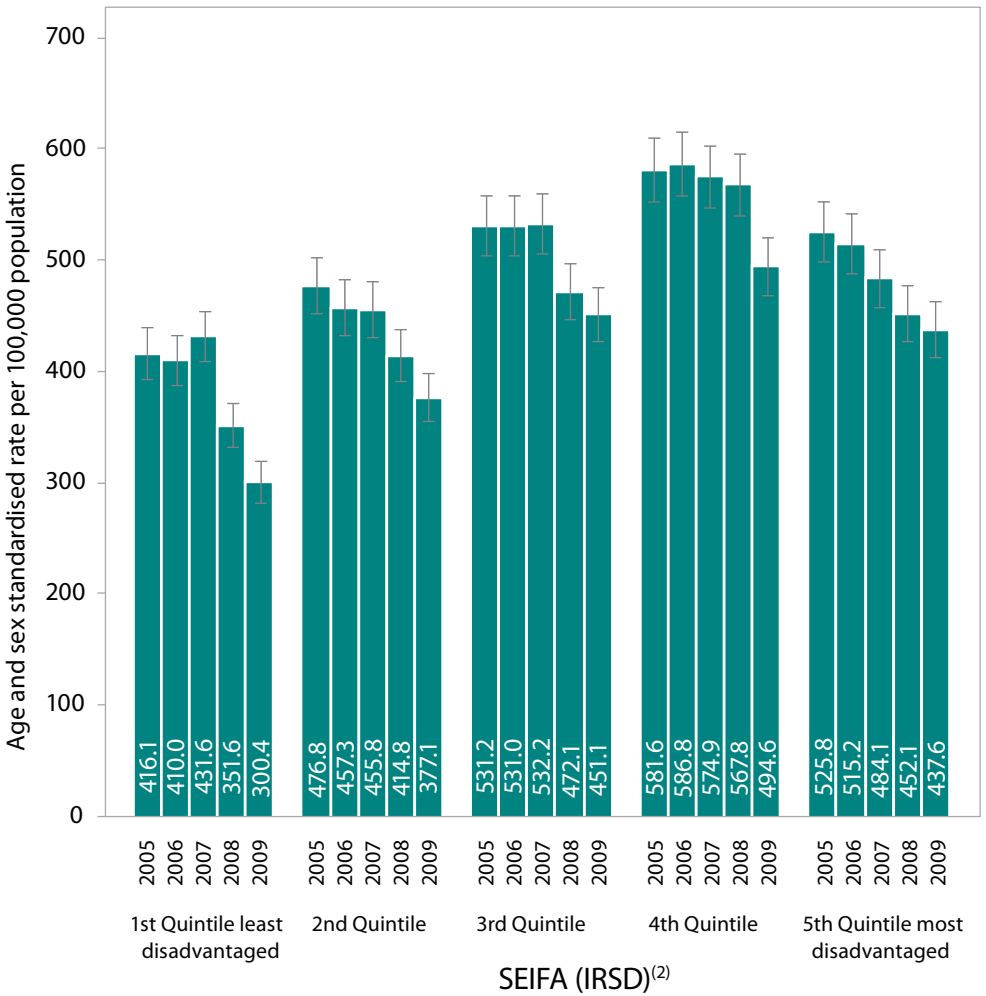
Hysterectomy rates for women aged 35-69 years by ARIA[1] and SEIFA (IRSD)[2]

Chart 11-4

Hysterectomy rates per 100,000 women aged 35-69 years by combined remoteness region, 2005-2009



Hysterectomy rates per 100,000 women aged 35-69 years by socio-economic status quintile (Index of relative socio-economic disadvantage), 2005-2009



Source: NSW Admitted Patient Data Collection and ABS population estimates (HOIST), Centre for Epidemiology and Research, NSW Ministry of Health.
(1) Accessibility/Remoteness Index of Australia, ABS 1216.0 (2006).
(2) Socio-economic Indices for Areas (Index of Relative Socio-economic Disadvantage) ABS 2039.0 (2008).

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Why is this important? Myringotomy is a surgical procedure in which a tiny incision is created in the eardrum to relieve pressure caused by excessive build-up of fluid in the middle ear ("glue ear"), or to drain pus (Browning, Rovers, Williamson, Lous, & Burton, 2010). The procedure often includes the placement of ventilation tubes (grommets) to keep the eardrum open and allow air to equalise between the middle ear and outer ear canal. Myringotomy and insertion of grommets is commonly used to improve the hearing of children with chronic otitis media with effusion (OME). OME is a common condition in childhood and for most is a transient problem. It will affect up to 80 per cent of preschool children at some time. A Cochrane Systematic Review (Lous *et al*., 2005) concluded that grommets only offer a short-term hearing improvement in children with simple glue ear (OME) and no other serious medical problems. No effect on speech and language development has been proven. The review concluded that watchful waiting is the appropriate management strategy for most children with glue ear.

Guidelines issued by NSW Health (2004) recommend symptomatic treatment of OME in uncomplicated cases. Referral to an ear, nose and throat consultant for consideration of myringotomy and tympanostomy tubes is recommended if there is:

- OME for three months or more, with evidence of hearing loss
- three episodes or more of acute otitis media (AOM) in six months, or four or more in 12 months
- retracted tympanic membrane or damage to the ossicles.

The following charts illustrate data for persons under 15 years. Data refers to the patient's local health district of usual residence.

Findings: The number of children under 15 years living in NSW who had a myringotomy has fluctuated in recent years, from 6,387 in 2005 to 7,814 in 2008. In 2009, 7,248 myringotomies were performed in this age group. Age-standardised rates increased from 483 per 100,000 in 2005, to 527 in 2009. Across local health districts, rates in 2009 ranged from 217 per 100,000 population in Northern NSW to 904 in Northern Sydney. Between 2005 and 2009, children in least disadvantaged socio-economic groups were more likely to undergo myringotomy than those in more disadvantaged groups (803 vs 360 per 100,000). Age-standardised rates are higher in major cities and inner regional areas than in more remote locations (CEC, 2011b). Data in Chapter 12 shows that myringotomies are less commonly performed in Aboriginal children, compared to non-Aboriginal children.

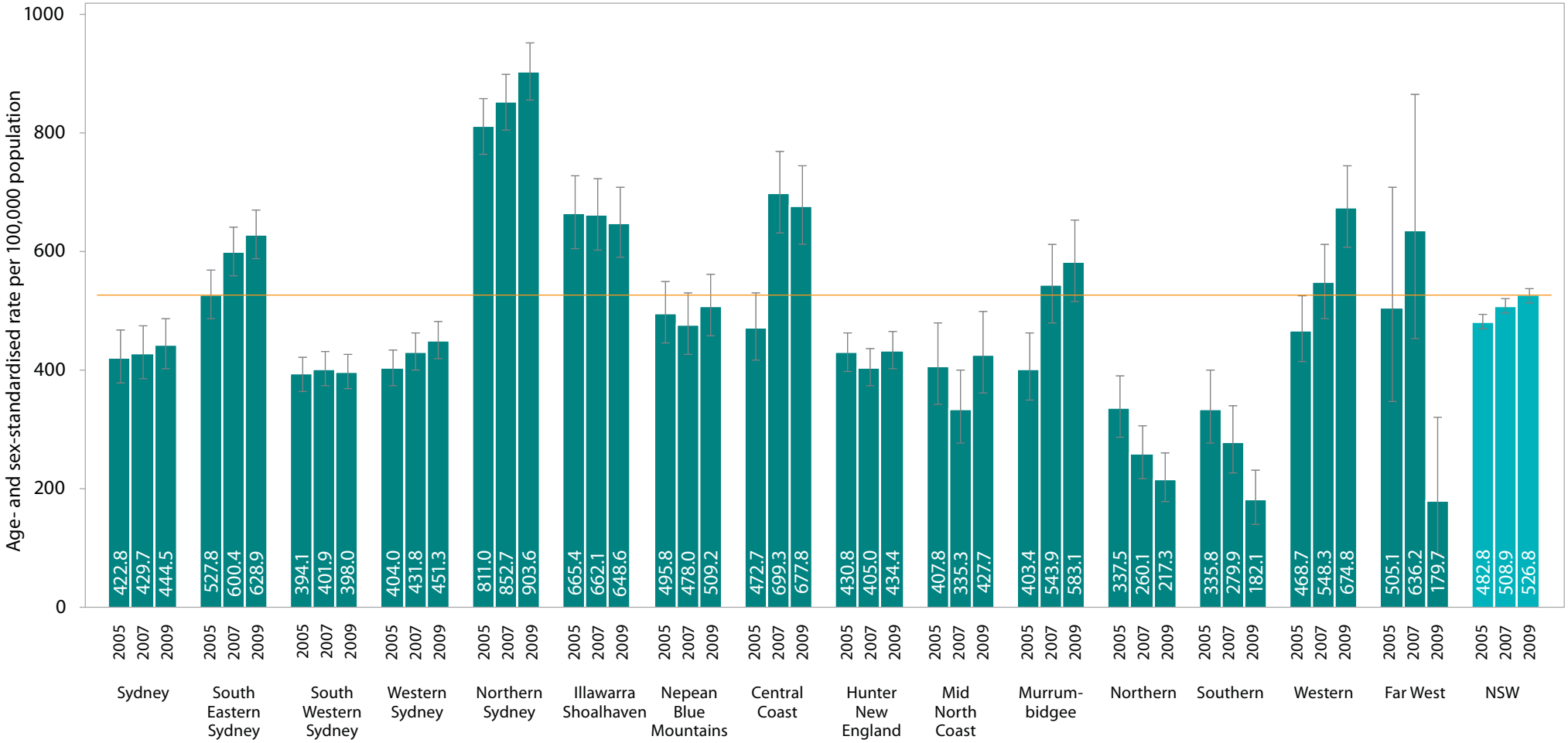
Implications: The data for NSW shows substantial variation between regions and an overall increase in rates of myringotomy since 2005. The reasons for variations between local health districts and across socio-economic status (SES) are not known. Factors that have been suggested include variation in access to hearing tests for young children, that families living in more advantaged socio-economic regions have better access and are more proactive in seeking medical management, variations in health insurance and in access to private hospital options, variations in waiting times for surgery and in the use of day care facilities and the type of early childhood care used by parents.

What we don't know: Why is there such a variation in the rate of provision of myringotomy across SES groups?

Myringotomy rates

Chart 11-5

Myringotomy rates per 100,000 population, for persons aged less than 15 years by local health district of usual residence, 2005-2009



Source: NSW Admitted Patient Data Collection and ABS population estimates (HOIST), Centre for Epidemiology and Research, NSW Ministry of Health.

Why is this important? A cataract is a clouding that develops in the crystalline lens of the eye, or its envelope. Most cataracts are related to age, but can also be influenced by other factors, such as trauma or drug side-effects. Cataracts usually grow slowly and do not impede vision until after a number of years have elapsed. Surgery is the only option for treatment once the lens has become opaque and vision is impaired. Surgery involves removal of the natural lens and replacement with an intraocular lens implant. Age-related cataract is the leading cause of blindness globally (Riaz *et al*., 2006) and cataract extraction accounts for the majority of ophthalmic procedures in Australia (McCarty, Nanjan, & Taylor, 2000). By the time people reach the age of 90 , most will have developed cataracts and half will have had cataract surgery. Cataract surgery is commonly undertaken as a day-procedure. It is safe and cost-effective and has an enormous impact on quality of life (Fedorowicz, Lawrence, & Gutierrez, 2005). Almost all operations are routinely done under some form of local anaesthetic (Rosha *et al*., 2006). There are four main types of cataract extraction surgery: intracapsular (ICCE), extracapsular (ECCE), phacoemulsification (PHACO) and manual small incision (MSICS). A review of RCTs indicated that PHACO gives a better visual outcome than ECCE (Riaz, *et al*., 2006) and is the dominant type of surgery performed in NSW. The data presented in the chart is for local health district of usual residence.

Findings: The number of hospitalisations and day-surgery procedures due to lens and cataract procedures, for those aged 65 and over living in NSW, increased from 42,006 in 2001 to 56,352 in 2009 (34 per cent increase). The majority were performed in private hospitals and private day-procedure centres (CEC, 2011b). In 2008, 69 per cent were performed in private sector settings. In 2009, the rate of these procedures was 5,775 per 100,000 people aged 65 years and over in NSW.

Age-standardised rates of lens and cataract procedures varied significantly between local health districts. In 2009, the highest rate was for people living in Mid North Coast (8,318 per 100,000 persons aged 65 and over) and the lowest in Far West (2,225). It should be noted that the 2009 data for residents of Southern NSW and Far West, excludes resident flows to hospitals in the ACT and SA, respectively.

Implications: Loss of vision is more of a problem than is usually recognised. When compared with people with normal vision, those with impaired vision have an increased risk of falls and hip fractures, depression, difficulties with activities of daily living and social functioning (Taylor *et al*., 2005).

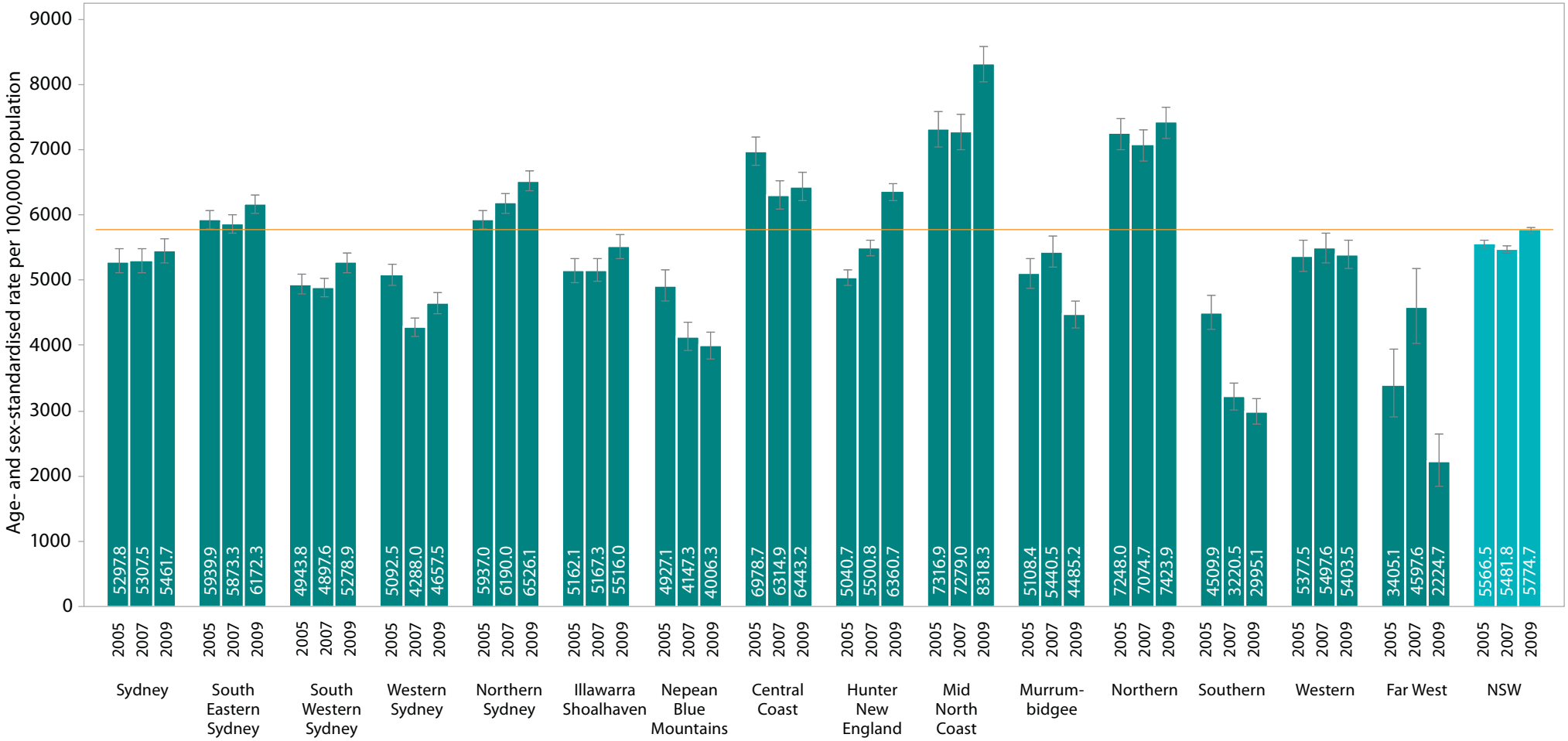
Research data points to the exponential increase in vision loss with increasing age. The increasing ageing of the population will have a significant impact on the number of people in NSW with vision loss and blindness. Those with low vision and blindness are projected to almost double by 2024 (Taylor, *et al*., 2005). Access to services for cataract surgery has an important part to play in preventing falls and improving quality of life for older people.

What we don't know: There is no known medical treatment that prevents or delays cataract onset. There are, however, genetic and environmental factors that contribute to cataract development, including cumulative UV light exposure, smoking and excessive alcohol intake. These are modifiable environmental risk factors for cataract development (McCluskey, 2012).

Cataract and lens procedure rates

Chart 11-6

Cataract and lens procedure rates per 100,000 population for people aged 65 years and over by local health district of usual residence, 2005-2009



Source: NSW Admitted Patient Data Collection and ABS population estimates (HOIST), Centre for Epidemiology and Research, NSW Ministry of Health.

Why is this important? Elective, (or booked) patients are those who require non-emergency admission to hospital, where, in the opinion of the treating clinician, admission can be delayed for at least 24 hours. Elective patients are placed on the hospital's booking or waiting list. Medical and surgical patients are categorised by a clinical priority category, to ensure that they receive care within the appropriate timeframe. Ready for Care Category 1 patients are those whose referring doctor has recommended that the admission should occur within 30 days. There are several measures of waiting-time performance. They can be based on throughput in a given period, or a 'census' that reflects the situation at a certain point in time. Those presented below are census measures and include:

- The number of Category 1 patients who are ready for care and have waited longer than 30 days at 31 December
- The number of patients who are ready for care and have waited longer than 365 days at 31 December
- The average waiting time of elective patients who are ready for care and admitted in the year at 31 December.

Better management of hospital services helps patients avoid excessive waits for elective treatment. Improved quality of life may be achieved more quickly, as well as patient satisfaction and community confidence in the healthcare system. Waiting for elective treatment is an important issue for patients and members of the public. Governments have challenged the healthcare system to improve performance. In recent years, various measures designed to achieve these improvements have been introduced in NSW Health. They include *The Predictable Surgery Program, Waiting Time and Elective Patient Management Policy* (March 2006) and the Surgery Futures Project. Significant additional funds have also been provided to reduce the numbers of patients on the waiting list classified as 'overdue'.

Findings: The number of Category 1 medical and surgical patients waiting longer than 30 days at 31 December 2010 was 355. The majority of this total represent patients awaiting medical, as opposed to surgical treatment (Brandt, 2011). This represents an increase compared to 2008, when only 40 Category 1 patients were waiting more than 30 days, but a marked reduction on the 2004 data when there were 4,385 on the list (CEC, 2010). The number of ready-for-care patients in all categories waiting longer than one year at 31 December 2010 was 331. This represents a substantial reduction on the 1,657 patients waiting more than one year in the previous year, but a slight increase on the 75 patients waiting longer than one year at 30 June 2006.

Waiting time is calculated by subtracting the listing date for care from the removal date, minus any days when the patient was not ready for care. The average waiting time in NSW has increased from 2.5 months in 2006 to 3.1 months in 2010.

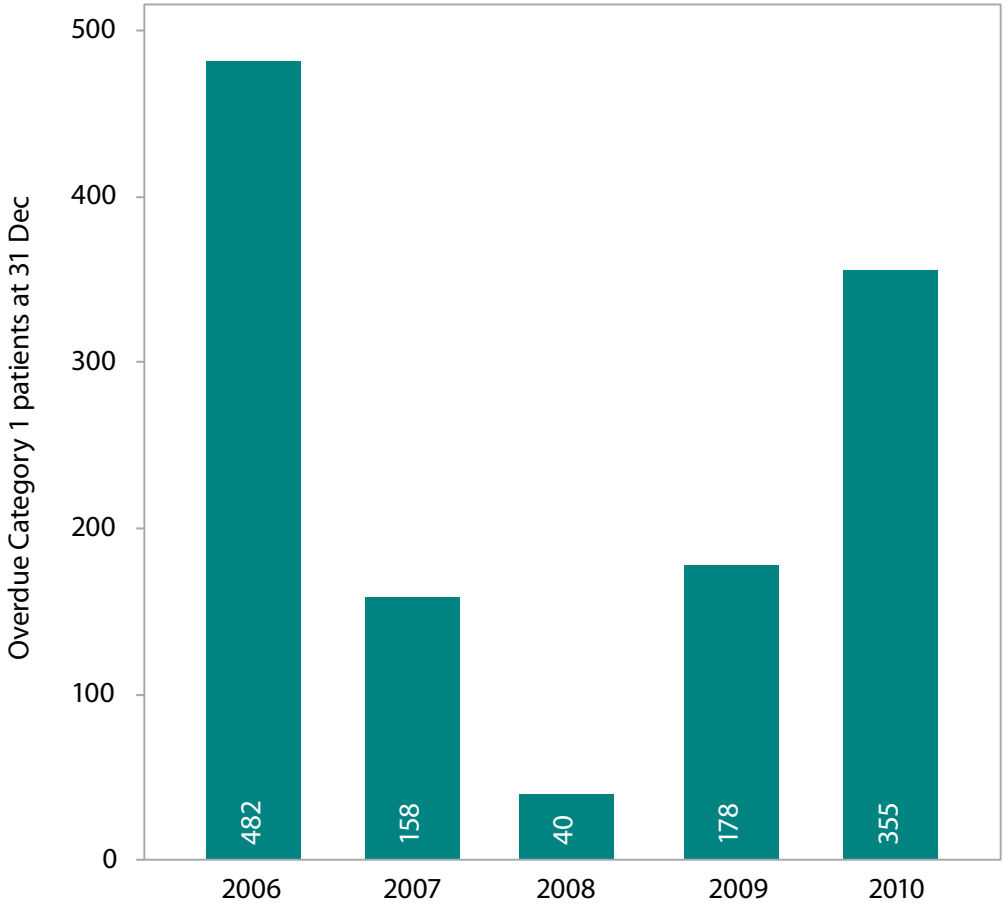
Average clearance times vary across local health districts. St Vincent's Health Network had the lowest clearance times (1.0 month). The local health districts with the highest clearance times are Mid North Coast (4.6 months), Nepean Blue Mountains (4.2 months), and Illawarra Shoalhaven, Southern NSW and South Western Sydney (4.0 months).

Implications: Implementation of a range of measures has contributed to significantly improved performance in waiting times for elective/booked treatment over the past five years. A major challenge will be to maintain this level of performance.

Waiting for booked treatment (greater than 30 days)

Chart 11-7

Number of medical and surgical overdue patients as at end of the year: Category 1 patients waiting greater than 30 days by local health district of usual residence, 2006-2010



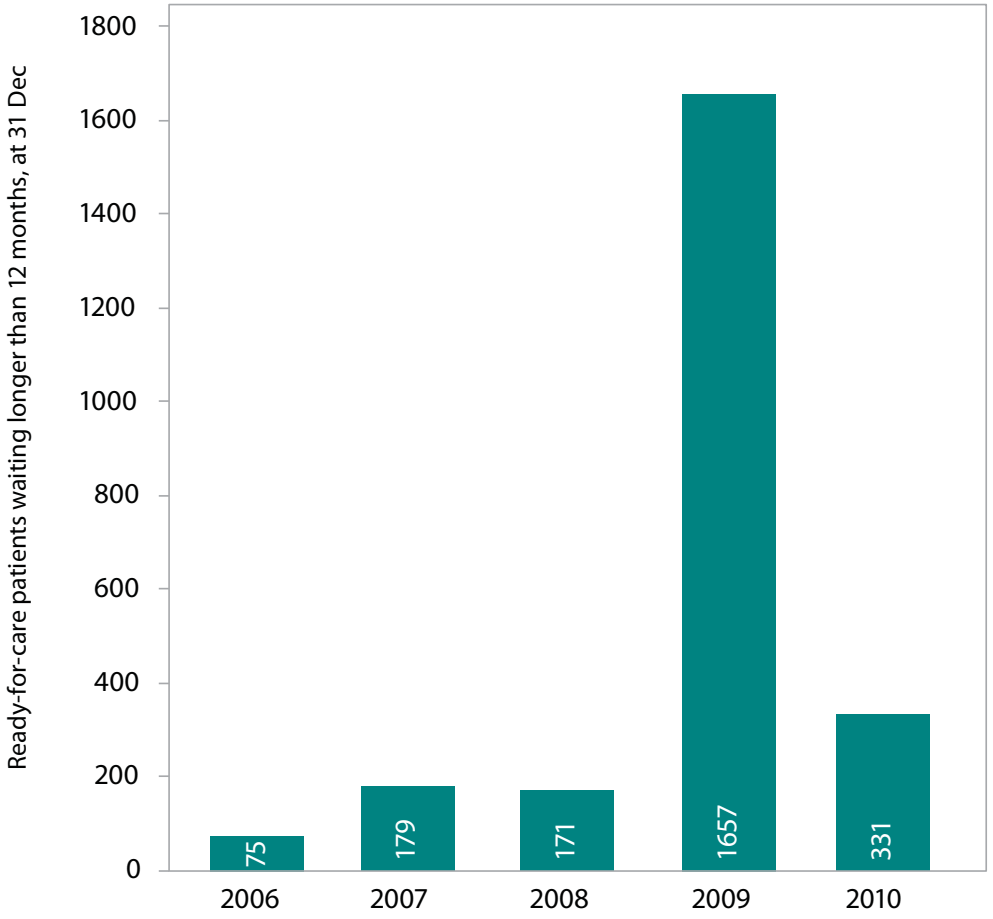
	2006	2007	2008	2009	2010
Sydney Children's Hospitals Network		3	1		3
St Vincent's Health Network	7		11	10	5
Sydney	22	4		1	
South Western Sydney	133	14		7	
South Eastern Sydney					
Illawarra Shoalhaven	31	8	13	14	
Western Sydney				17	93
Nepean Blue Mountains	9			6	1
Northern Sydney	90	7			
Central Coast	3	2			46
Hunter New England	164	55		7	
Northern NSW	19	34	7	81	183
Mid North Coast	2	28	5	25	23
Southern NSW		3	2	3	
Murrumbidgee	1		1		1
Western NSW	1				
Far West				7	
NSW	**482**	**158**	**40**	**178**	**355**

Source: Demand and Performance Evaluation Branch, NSW Health System Performance, NSW Ministry of Health.
Note: Albury excluded.

Waiting for booked treatment (greater than 12 months)

Chart 11-8

Number of long-wait patients as at end of the year: Medical and Surgical, ready-for-care patients waiting greater than 12 months by local health district of usual residence, 2006-2010



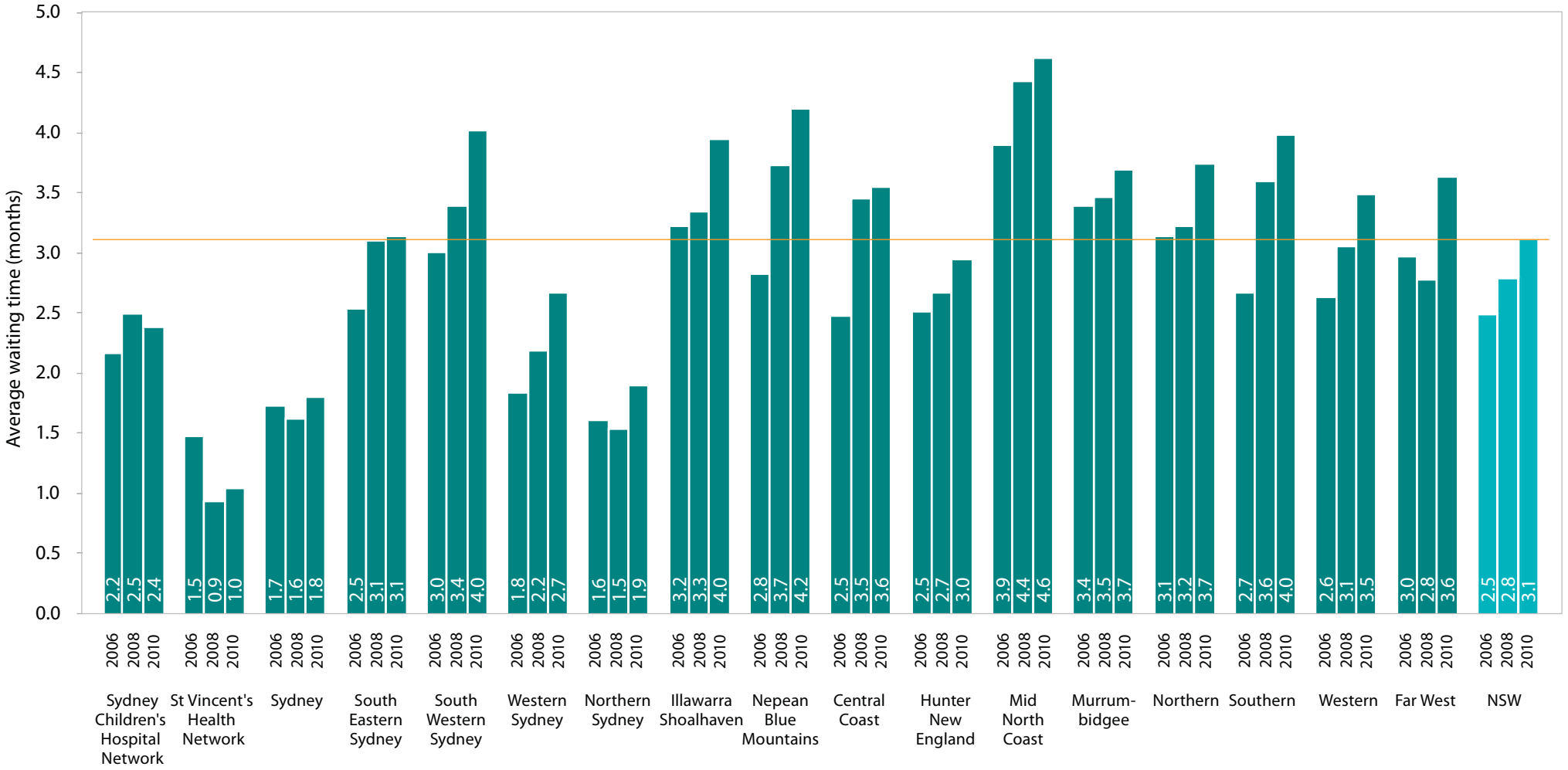
	2006	2007	2008	2009	2010
Sydney Children's Hospitals Network		1	15	98	39
St Vincent's Health Network	1		6	22	1
Sydney	2			2	
South Western Sydney	3	12	1	132	
South Eastern Sydney	3	3	6	151	
Illawarra Shoalhaven	14	2	37	5	
Western Sydney				166	73
Nepean Blue Mountains	23	30		221	95
Northern Sydney	15	7		11	
Central Coast	8	8	3	315	
Hunter New England	4	6	5	89	3
Northern NSW		10	51	107	54
Mid North Coast	2	48	41	171	46
Southern NSW			5	15	
Murrumbidgee		19	1	133	20
Western NSW		33		19	
Far West					
NSW	**75**	**179**	**171**	**1,657**	**331**

Source: Demand and Performance Evaluation Branch, NSW Health System Performance, NSW Ministry of Health.
Notes: *Cell counts of five or less are omitted; Albury excluded

Clearance time

Chart 11-9

Clearance time (months) Medical and Surgical, ready-for-care admitted patients by local health district of usual residence, 2006-2010



Source: Demand and Performance Evaluation Branch, NSW Health System Performance, NSW Ministry of Health.
Notes: Confidence intervals are not calculated as this is a population-based indicator.

Why is this important? A challenge for modern healthcare systems is to ensure that resources available are cost-effective. Efficient use of resources enables health services to maximise outcomes for patients and the broader community. Since the establishment of the Surgical Services Taskforce and the Surgery Futures Project in NSW, several opportunities have been pursued to improve the efficiency with which surgery is delivered. Two initiatives reflecting efficient use of resources are day-of-surgery admission and day-only surgery rates. Where surgery is planned, it is typically unnecessary for the patient to be admitted to hospital until the day of the procedure. Achieving high rates of day-of-surgery admissions, however, requires effective systems to ensure that patients have been properly assessed and prepared before admission. The provision of day-only surgery is based on the premise that the majority of surgical care can be administered on a same-day basis in a non-ward environment. Patients can be admitted, prepared for their surgical procedure, then monitored and provided with appropriate pain relief post-surgery before discharge. Day-only surgery is appropriate, safe and efficient for many procedures. The data presented here is the percentage of patients admitted and discharged on the same day.

Findings: In 2010, 93.5 per cent of NSW patients for elective surgery were admitted on the day of surgery, achieving the State benchmark of 90 per cent. This represents an increase from 86.7 per cent in 2004 (CEC, 2010). Day-of-surgery admission rates vary across local health districts, which may relate to variation in casemix, but most had rates of over 90 per cent in 2010, except Nepean Blue Mountains (79.9 per cent).

In 2010, 55.1 per cent of planned surgery cases were day-only. This represents a slight reduction from 56.2 per cent in 2006 and is below the benchmark rate of 60 per cent set by NSW Health for public hospitals. Rates vary across local health districts, although it is not clear whether they are impacted by the mix of patients across services. In general, rural local health districts had higher rates of day-only surgery.

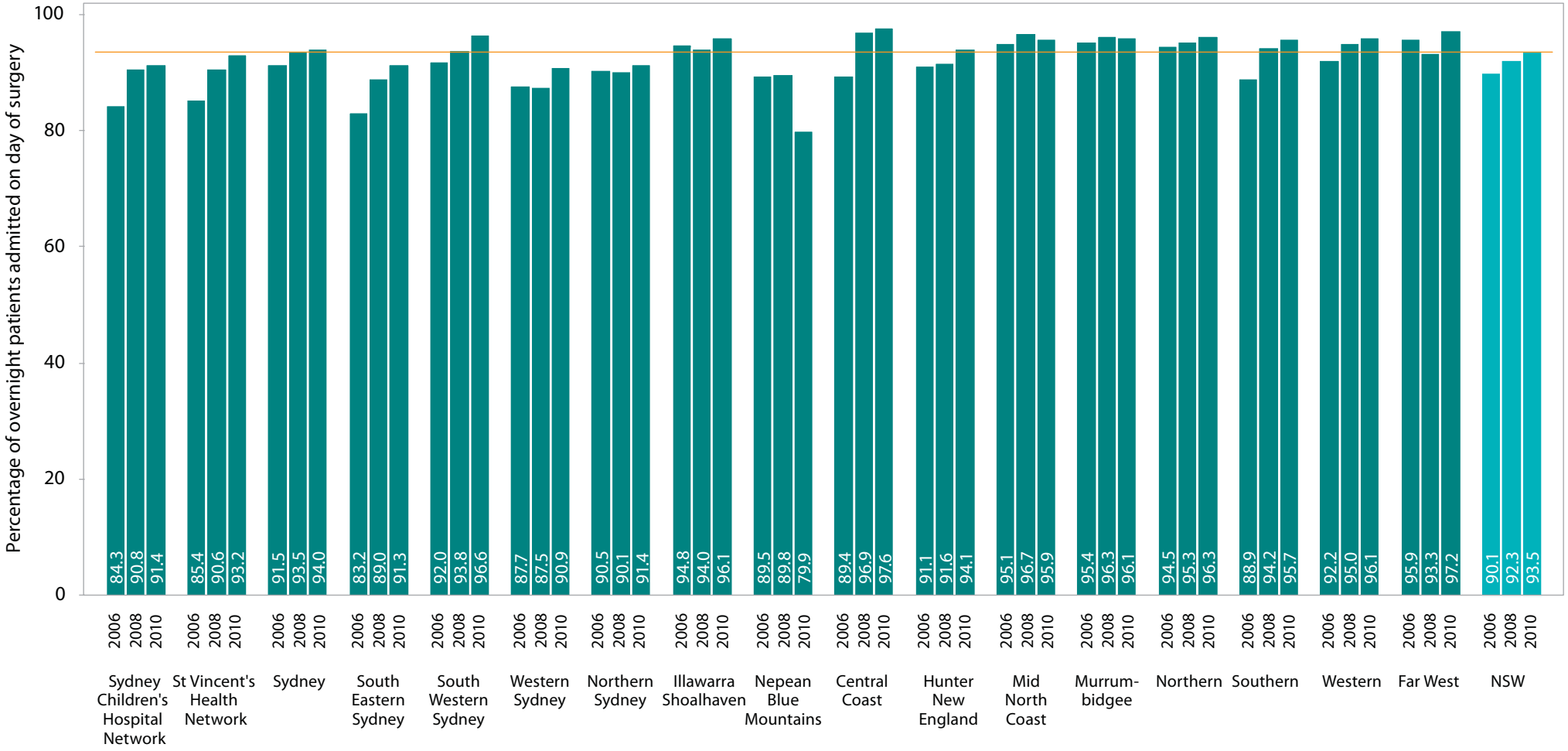
Implications: Day-of-surgery admission rates are high and have continued to increase over each of the last five years. Rates are impacted by the classification of patients as either admitted, or non-admitted. Many NSW public hospitals have introduced extended day-only or "23-hour units" where patients are admitted and discharged in less than 24 hours, but this may not necessarily involve being admitted and discharged on the same day. Overall, NSW hospitals tend to have a lower proportion of day-only admission compared to other States. A challenge will be to develop measures that control for variation in the mix of patients between hospitals and groups of hospitals.

What we don't know: How does NSW compare to other States in its day-of-surgery-admission and same-day surgery rates for a basket of the same procedures?

Day-of-surgery admissions

Chart 11-10

Day-of-surgery admissions: Percentage of patients admitted to hospital and have surgery on the same day by local health district of usual residence, 2006-2010

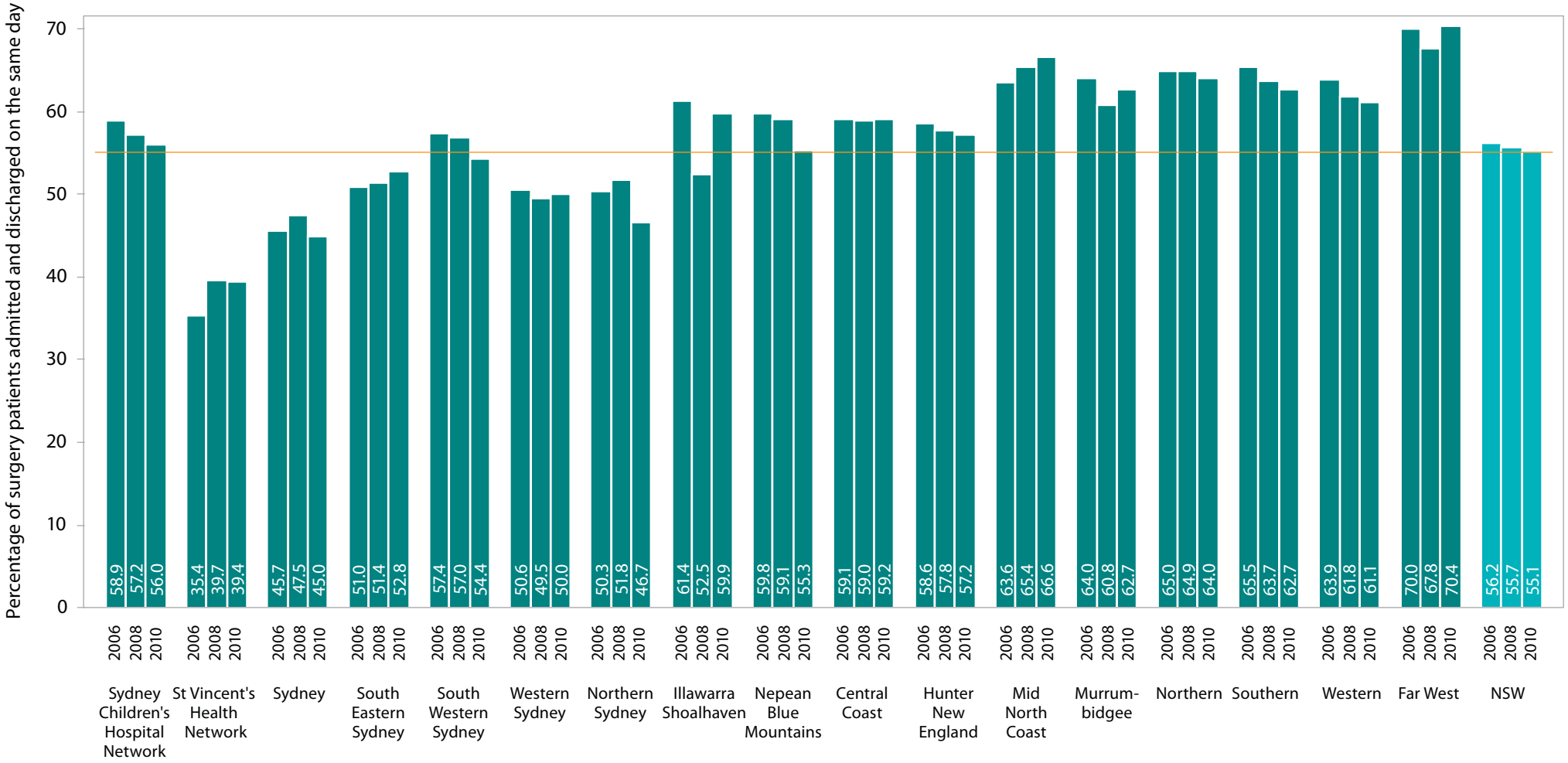


Source: Demand and Performance Evaluation Branch, NSW Health System Performance, NSW Ministry of Health.
Notes: Day-of-Surgery Admission calculations are based on 'intention' to operate not 'actual' operations. Confidence intervals are not calculated as this is a population-based indicator.

Day-only surgery

Chart 11-11

Day-only surgery: Percentage of patients admitted and discharged on the same day by local health district of usual residence, 2006-2010



Source: Demand and Performance Evaluation Branch, NSW Health System Performance, NSW Ministry of Health.
Notes: Day-only surgery calculations are based on 'intention' to operate not 'actual' operations. Confidence intervals are not calculated as this is a population-based indicator.

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Day-of-surgery admission and day-only surgery

CEC. (2010). Clinical Excellence Commission (CEC) 2010. Safety and Quality of Healthcare in NSW - *Chartbook 2009* Sydney. CEC (Information Management Series no. 7).

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ABORIGINAL HEALTH | Introduction

Chapter 12

There are an estimated 152,685 Aboriginal people living in NSW, comprising just over two per cent of the total NSW population (NSWDOH 2008b). The majority of Aboriginal people in NSW live in metropolitan and inner regional areas, with only 29 per cent living in outer regional, rural and remote areas. At the national level for 2005–2007, the gap between Aboriginal and non-Aboriginal life expectancy was 11.5 years for males and 9.7 years for females (SCRGSP 2011). For the period 2005-2007, the life expectancy at birth was 67.2 years for Aboriginal males and 72.9 years for females. This compares with average life expectancy of 78.5 years for males and 82.4 years for females for the non-Aboriginal population (SCRGSP 2011). The difference in mortality is especially pronounced between the ages of 35 and 54 years, where the Aboriginal death rates are five times higher (AIHW, 2008b). The leading causes of death for Aboriginal people are the same as for non-Aboriginal people – cardiovascular disease and cancer. Aboriginal people are, however, more than twice as likely as non-Aboriginal people to die as a result of diabetes, or from injuries (NSWDOH 2008b). The prevalence of chronic health conditions, standardised for age, is significantly higher for Aboriginal people. For example, Aboriginal people experience 3.4 times the prevalence of diabetes and 1.6 times the prevalence of asthma, compared to total Australians (AIHW 2008b).

The reasons for the poorer health status of Aboriginal people are multifactorial, an outcome of the interplay of social and physiological determinants of health. These include socio-economic, environmental, social, political and specific health risk factors, as well as relative lack of access to primary health and hospital care (AIHW 2008b; AHMAC 2011c). A range of data indicates that Aboriginal people are significantly disadvantaged compared to non-Aboriginal people in relation to a number of socio-economic indices, including lower income, higher rates of unemployment, lower educational achievement and lower rates of home ownership (AIHW 2008b). The socio-economic disadvantage experienced by Aboriginal people compared with non-Aboriginal people, compounded by limitations on self-determination, places Aboriginal people at greater risk of exposure and vulnerability to health risk factors, such as poor nutrition, low physical activity, smoking and alcohol misuse and other risk factors such as exposure to violence. For example, self-reported data shows that in NSW during 2006-2009, Aboriginal people smoked at twice the rate of non-Aboriginal people, obesity rates in Aboriginal populations were significantly higher and nutrition was much poorer (CER 2007; CER 2010b).

The focus of NSW Health is on the range of health programs, including maternal and child health, chronic care, health promotion, otitis media, oral health, mental health, drug and alcohol misuse, family violence, healthy housing and living practices and water and sewerage. In recent years, continuous improvements in Aboriginal health have been supported through *The NSW Implementation Plan on Closing the Gap in Indigenous Health Outcomes, Centre for Aboriginal Health* (NSWDOH 2008b). However, national reporting continues to highlight the gap between Aboriginal and non-Aboriginal Australians (AHMAC 2011c, SCRGSP 2011). This chapter presents a selection of indicators that show both the gains that have been made, and also the need for further improvement. This includes timely initiation of antenatal care from NSW Midwives Data Collection (MDC), hospitalisation rates for asthma, chronic obstructive pulmonary disease and diabetes, for Aboriginal people, from NSW hospital-admitted patient data.

Technical note: The quality of collection of data on the level of identification of Aboriginal people in health administrative data sets in NSW varies. The AIHW conducted a national validation survey of patients in hospitals in 2007, to provide comparative data for the first time on the level of underestimation of Aboriginal people in hospital data. The results showed that the estimated level of enumeration in hospital-admitted patient data in NSW was 88 per cent. Coverage varied by geographic area: major cities = 81 per cent; inner regional areas = 89 per cent; outer regional areas = 95 per cent; and remote and very remote areas = 100 per cent (AIHW, 2007).

Under-enumeration can introduce bias in the study results if it is systemic. There is evidence of bias based on place of residence in hospital data in NSW. Efforts are currently being made to improve the quality and completeness of Aboriginal identification in health data collections. The linkage of data from various health administrative data sets has the potential to improve 'identification' of Aboriginal records for statistical purposes. http://www.health.nsw.gov.au/publichealth/chorep/atsi/atsi_acreskidhos.asp

Why is this important? Circulatory disease is a major cause of morbidity and mortality in older Australians. In recent decades, Australian mortality rates from circulatory disease have fallen considerably, due to factors such as reduced smoking rates and improved treatment of high blood pressure and ischaemic heart disease (IHD). However, recent trends in Australian society, such as increased levels of obesity and diabetes, threaten to slow or reverse these improvements. Circulatory disease occurs much more frequently in Aboriginal people and at much younger ages. Circulatory disease accounts for 17 per cent of the burden of disease in Aboriginal people (Vos *et al*. 2007) and 27 per cent of mortality (ABS 2008a). Smoking levels are high (47 per cent) among Aboriginal and Torres Strait Islander adults with evidence of a small reduction in the most recent period (51 per cent in 2002 to 47 per cent in 2008), while levels of physical inactivity and obesity, diabetes and high blood pressure are much higher than for non-Aboriginal people (ABS2010a). Additionally, low socio-economic status is associated both with greater risk of developing circulatory disease and with lower chance of receiving appropriate treatment (Beard *et al*., 2008; Cunningham 2010). In 2004–05, approximately 12 per cent of Aboriginal people reported having a circulatory condition. After adjusting for differences in the age structure of the two populations, Aboriginal people were 1.2 times as likely to have circulatory disease as non-Aboriginal people—twice as likely for coronary heart disease (Penm 2008).

Findings: Over the period 2005-2009, 1,961 Aboriginal people were admitted to hospital in NSW with a primary diagnosis of acute myocardial infarction (AMI). This represents an age-sex adjusted rate of 358.9 admissions per 100,000 population, which is over two and a half times that for the total NSW population (135 per 100,000 population). AMI hospitalisation rates for the Aboriginal population were significantly higher than those for the total population in most local health districts (the exceptions being Northern Sydney, South Eastern Sydney and Nepean Blue Mountains) which is likely to be due to small population sizes. AMI hospitalisation rates for Aboriginal people were significantly higher than for non-Aboriginal people in rural health districts.

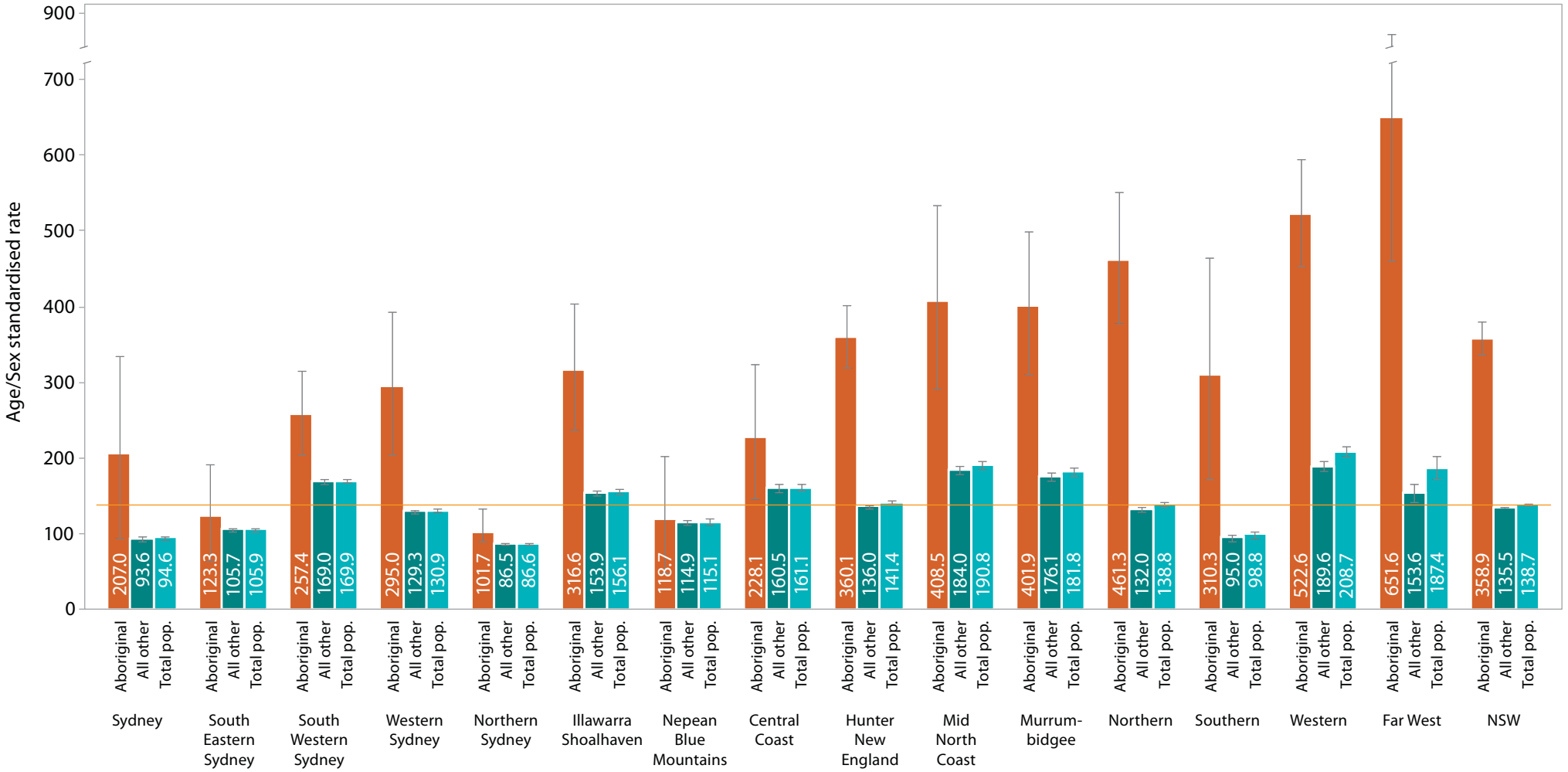
Implications: Although the self-reported prevalence of circulatory disease for Aboriginal people is only slightly higher than for other Australians, mortality rates and hospitalisation rates are much higher (ABS 2008a). Circulatory problems were managed at general practice encounters at similar rates for Aboriginal patients and other patients. High rates of hospitalisation and mortality indicate a failure in the areas of prevention, early detection, early treatment and chronic disease management. Smoking, physical inactivity, poor diet, high alcohol consumption, obesity and diabetes all damage the circulatory system. Australian cohort studies suggest obesity rates are similar between Aboriginal children and non-Aboriginal children (Wolfenden 2011). This suggests that cardiovascular health disparities manifest beyond childhood, providing opportunity for prevention (Haysom *et al*. 2009). While there have been improvements in Aboriginal circulatory disease mortality rates over the last decade, it is still the most common cause of death (27 per cent). A better understanding is required of why GP attendances for hypertension and cardiac check-ups are relatively low for Aboriginal people, considering the higher mortality rates. Improved access to and utilisation of both primary and acute care services for Aboriginal people are necessary to achieve earlier diagnosis and better management of circulatory disease.

What we don't know: What is the level of primary health care and ongoing chronic care being received by the Aboriginal population compared to the non-Aboriginal population?

Aboriginal health: AMI hospitalisations 2005-2009

Chart 12-1

AMI admission rate per 100,000 population for Aboriginal, all other and total population by local health district of usual residence, 2005-2009



Source: NSW Admitted Patient Data Collection and ABS population estimates (HOIST), Centre for Epidemiology and Research, NSW Ministry of Health.

Why is this important? Asthma is a chronic inflammatory disorder of the airways that results in obstruction of airflow in response to specific triggers. Asthma remains a significant health problem in Australia, with prevalence rates that are high by international comparison (AIHW 2011c). In 2007–08, the prevalence of current asthma in Australia was about 9.9 per cent and the rate for children aged 0-15 years was 10.4 per cent (AIHW 2011c). Since 2001, the prevalence of current asthma has declined in children and young adults, but remained stable in adults aged 35 years and over (AIHW 2011c). In NSW over the period 2006-2009, 20.2 per cent of Aboriginal people aged 16 and over reported having current asthma (CER 2010b), almost double the rate for adults overall (10.5 per cent) in 2009 (CER 2010). Reported asthma prevalence in NSW was higher in Aboriginal people than in the general population across all age groups. There was no significant difference between Aboriginal males and females. Among Aboriginal females, a significantly lower proportion of those aged 55-64 years (13.3 per cent) had current asthma, compared with the overall Aboriginal adult female population (CER 2010b). In the general community, hospitalisation rates have decreased since the early 1990s, but asthma remains an important reason for hospital admission (NSWDOH 2006h). (See also comments and chart on pages 94-95).

Findings: Over the period 2005-2009, 825 Aboriginal people aged 5-34 years old were admitted to hospital in NSW with a primary diagnosis of asthma. The diagnosis of asthma is the most reliable in those aged 5-34 years and data is presented for this age group. This represents an age-sex adjusted rate of 173.3 admissions per 100,000 population, which is around one-third higher than the rate for the total NSW population (120.0 per 100,000 population). The number of asthma admissions for Aboriginal people increased from 166 per 100,000 between 2003 and 2007 to 173.3 between 2005 and 2009 (CEC 2010). Across local health districts, Aboriginal hospitalisation rates per 100,000 population for 2005-2009 varied from 109 in South Western Sydney to 328.6 in Northern NSW.

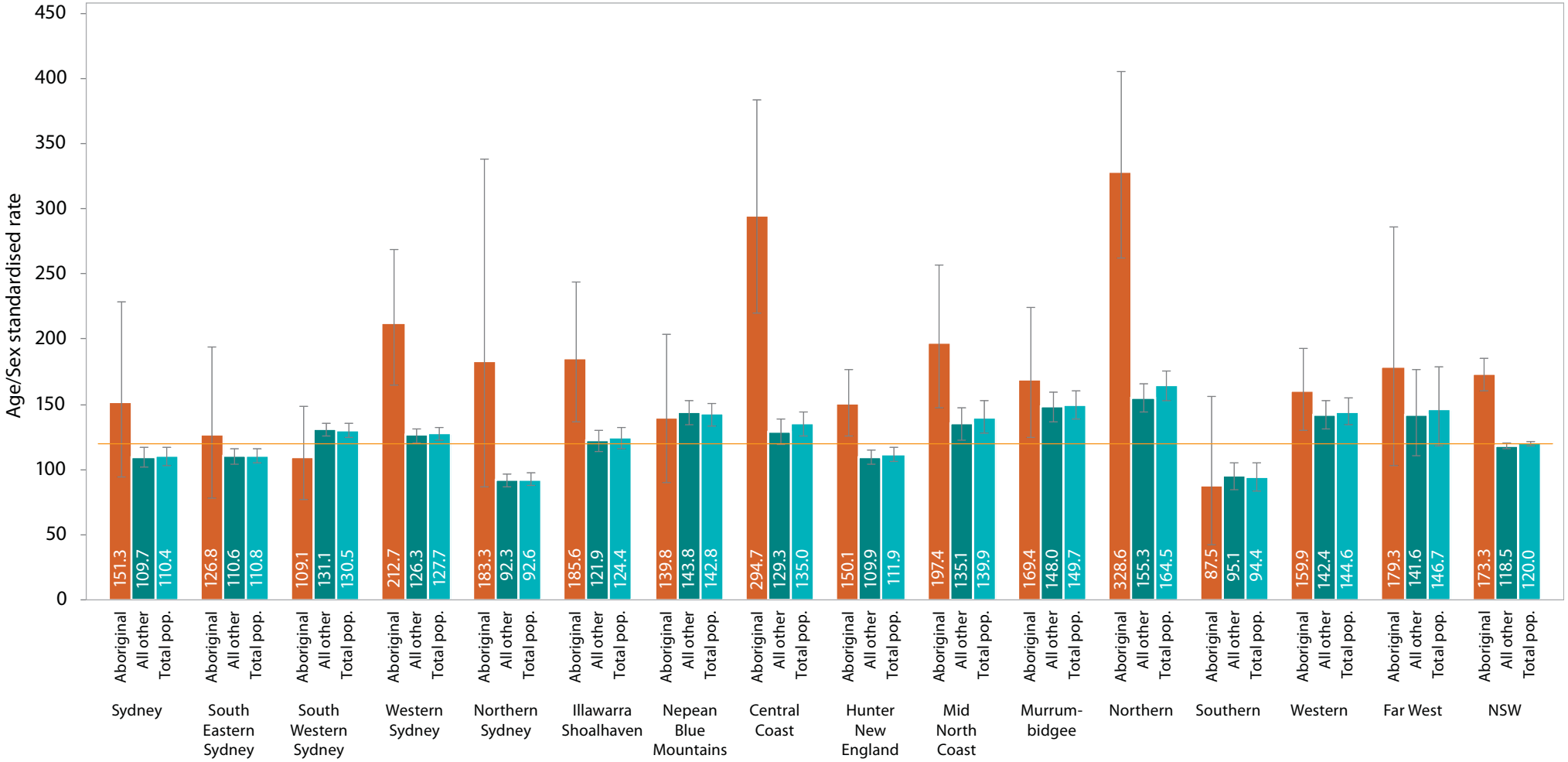
Implications: The higher rate of hospital admissions for asthma for the Aboriginal population mirrors that for respiratory conditions in general and may be due to many factors. These include environmental factors, availability of primary health care and accessibility of hospital services and the effectiveness of ongoing disease management, including support and education for the use of an asthma management plan (AIHW 2005a).

What we don't know: What strategies are shown to be effective in reducing the prevalence of asthma in the Aboriginal population?

Aboriginal health: asthma hospitalisations 2005-2009

Chart 12-2

Asthma hospitalisation rate per 100,000 population for people aged between 5 and 34 years for Aboriginal, all other and total population by local health district of usual residence, 2005-2009



Source: NSW Admitted Patient Data Collection and ABS population estimates (HOIST), Centre for Epidemiology and Research, NSW Ministry of Health.

Why is this important? Chronic respiratory diseases accounted for 8.9 per cent of the total burden of disease, measured in disability-adjusted life years for the Aboriginal population in Australia (ABS 2008a). Over the period 2004-2008 in NSW, age adjusted hospitalisation rates for chronic obstructive pulmonary diseases for Aboriginal people were around three times higher than for non-Aboriginal people (CEC 2010). During this period the hospitalisation rate for Aboriginal people increased, concurrent with a decrease in the rate for the non-Aboriginal population.

Chronic obstructive pulmonary disease (COPD), a type of chronic respiratory disease, is a major health problem for Aboriginal people. It is a progressive syndrome, caused by chronic inflammation of the airways and lungs.

The 2008 National Aboriginal and Torres Strait Islander Social Survey (NATSISS) found that nearly half (47 per cent) of the Aboriginal adult population in Australia were daily cigarette smokers (ABS 2010a). Respiratory problems were most frequently managed at GP encounters, representing around 20 per cent of GP encounters with Aboriginal clients (ABS, 2008a) (See again comments and chart on pages 96-97).

Findings: Over the period 2005-2009, 3,488 Aboriginal people were admitted to hospital in NSW with a primary diagnosis of COPD. This represents an age-sex adjusted rate of 638.4 admissions per 100,000 population, which is over three times that for the total NSW population (109 per 100,000 population). COPD hospitalisation rates for the Aboriginal population were significantly higher than those for the total population in all local health districts. There were, however, significant differences across areas. Mid North Coast recorded the highest Aboriginal hospitalisation rate (1096 per 100,000) with Aboriginal rates eight times that of the total population (132.6 per 100,000).

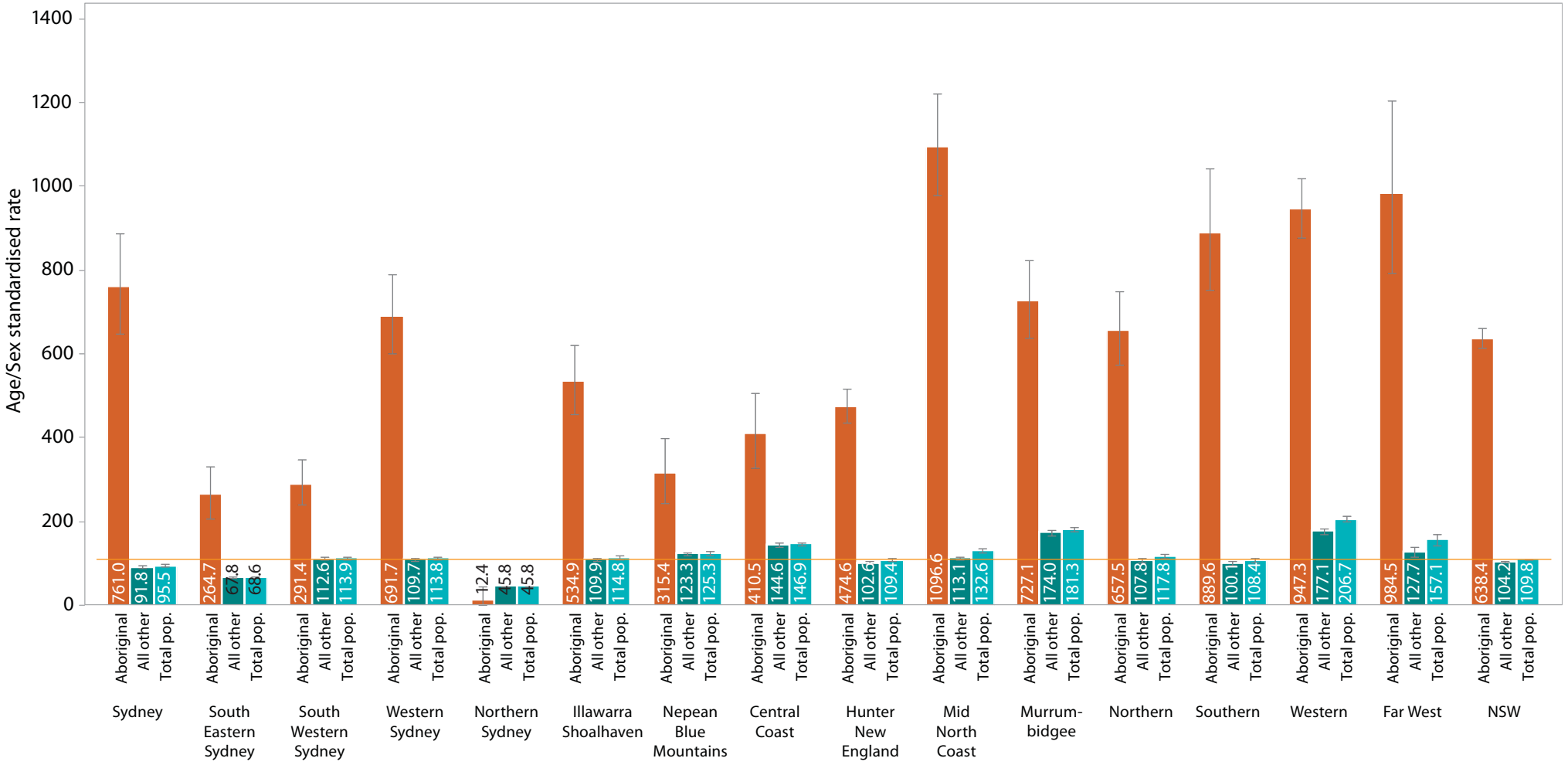
Implications: The significantly higher rate of COPD hospitalisation for the Aboriginal population is of concern. Increased uptake of Aboriginal specific Medicare chronic disease items has the potential to reduce the progression and complications of COPD which would ultimately reduce hospital admissions. Ensuring that hospitals are culturally competent, meet the needs of Aboriginal people – so that Aboriginal people don't discharge against medical advice (or don't come at all) would also impact on hospitaltisation rates. Better co-ordination of care through hospitals and ensuring GP contacts on discharge is also important. Culturally appropriate health promotion and improved access to primary care interventions, such as patient education, self-management and smoking cessation, are required to ameliorate the substantial gap in hospitalisation rates.

What we don't know: What models of care are most suitable for providing equitable care to Aboriginal people, specifically, the level of access to pulmonary rehabilitation, access to specialist care and the impact of discharge against medical advice on re-admission rates.

Aboriginal health: COPD hospitalisations 2005-2009

Chart 12-3

Chronic obstructive pulmonary disease (COPD) admission rate per 100,000 population for Aboriginal, all other and total population by local health district of usual residence, 2005-2009



Source: NSW Admitted Patient Data Collection and ABS population estimates (HOIST), Centre for Epidemiology and Research, NSW Ministry of Health.

Why is this important? Diabetes mellitus results in substantial morbidity and mortality across the entire Australian population, manifesting in cardiovascular complications, eye and kidney diseases and limb amputations (Barr 2006). For Aboriginal people, it represents a particularly significant health problem. Type 1 (early onset, insulin dependent) diabetes is rare among Aboriginal people, however, type 2 diabetes (later onset, usually non-insulin dependent) has a high prevalence among Aboriginal people. In NSW over the period 2006-2009, 7.7 per cent of Aboriginal people aged 16 years and over reported having diabetes or high blood sugar (CER 2007; CER 2010b). This compares with 7.3 per cent of the overall NSW adult population in 2008 (CER 2010). The onset of diabetes occurs earlier among Aboriginal people, which leads to a greater burden of illness associated with complications (NSWDOH 2009b). In 2003, diabetes accounted for 8.9 per cent of the total burden of disease, measured in disability adjusted life years for the Aboriginal population in Australia (ABS, 2008). Aboriginal people are much more likely than non-Aboriginal people to die as a result of diabetes (http://www.aihw.gov.au/diabetes-indicators/deaths/#table2).

Findings: In 2005-2009, the number of Aboriginal persons who were hospitalised with a principal diagnosis of diabetes was 4,118. The age and sex standardised rate of diabetes for Aboriginal people in NSW was 667.7 per 100,000 people; a rate over three times that recorded in the total population (210.2 per 100,000). The rate was highest in non-metropolitan local health districts, ranging from 660 per 100,000 for people in Hunter New England to 994 in Greater Western. It is notable that the hospitalisation rate for Aboriginal people is significantly higher than for the total NSW population. In some rural areas, the rate is even more proportionately higher. Diabetes hospitalisation rates for the Aboriginal population were significantly higher than those for the total population in all local health districts, with the exception of Northern Sydney which has a very small Aboriginal population. Western NSW recorded the highest Aboriginal hospitalisation rate (994.3 per 100,000). Northern NSW recorded the largest difference (approximately four and a-half times) in hospitalisation rates between Aboriginal people and the general population.

The data shown in this chart is for diabetes as a principal diagnosis for hospital admission only. Diabetes is more frequently reported as an additional or associated diagnosis than as a principal diagnosis. Among the complications of, or conditions associated with diabetes, are coronary heart disease, stroke, peripheral vascular disease, digestive diseases, cancer of the pancreas, retinopathy and kidney disease. (HealthInfoNet 2006). In 2004-05, around 20 per cent of hospitalisations for Aboriginal people for care involving dialysis, had diabetes as an associated diagnosis, compared with five per cent for other Australians (ABS 2008a).

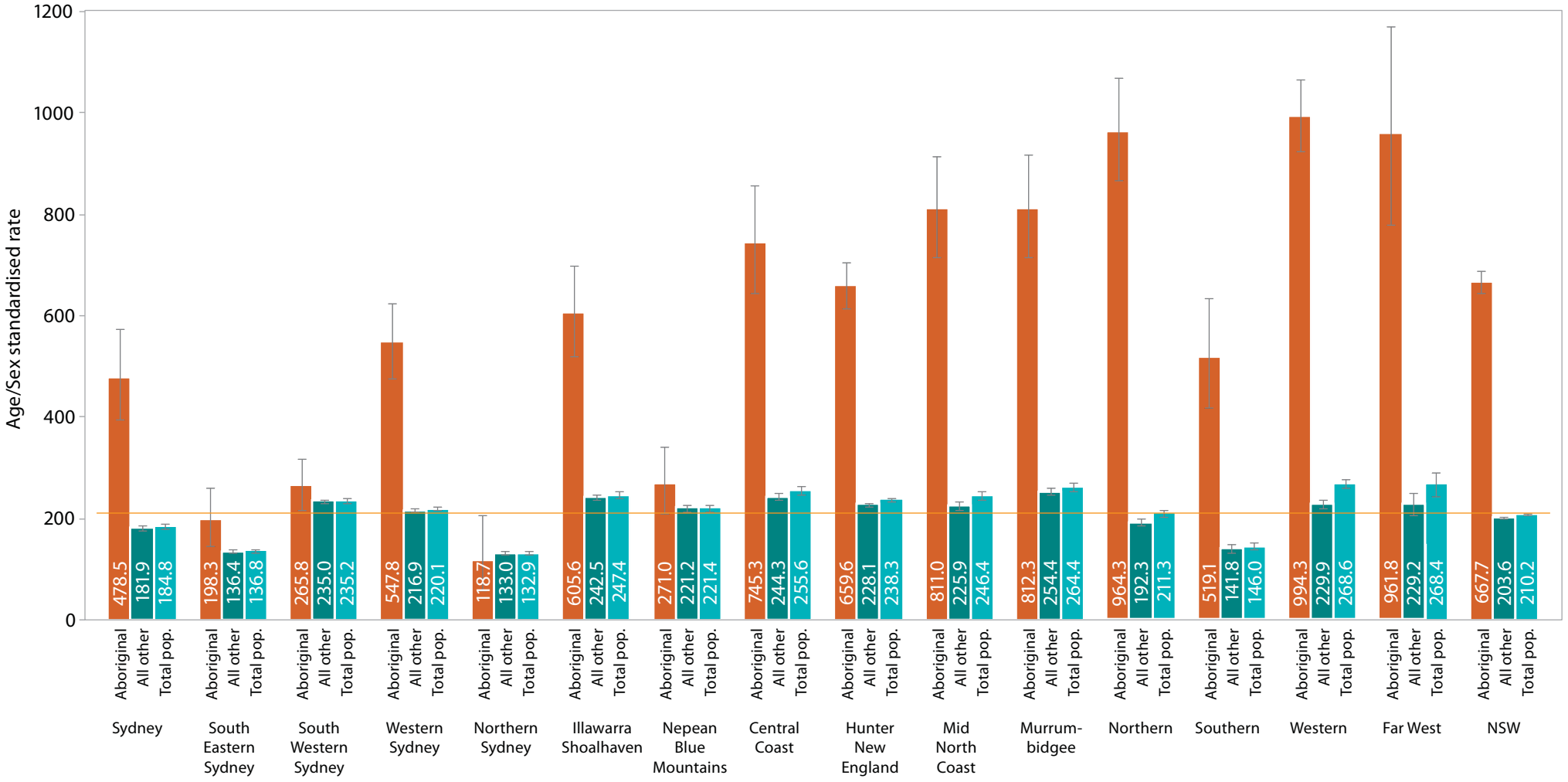
Implications: These findings underscore the importance of focusing on chronic disease care and addressing the underlying, antecedent causes (i.e., obesity, physical inactivity, unhealthy diet) of type 2 diabetes in the Aboriginal community. From 2007-08, NSW Health significantly increased funding for the NSW Chronic Care for Aboriginal People Strategy and the NSW Aboriginal Health Promotion Program.

What we don't know: What is the level of primary healthcare being received by the Aboriginal population, compared with non-Aboriginal population?

Aboriginal health: diabetes hospitalisations 2005-2009

Chart 12-4

Diabetes hospitalisation rate per 100,000 population for Aboriginal, all other and total population by local health district of usual residence, 2005-2009



Source: NSW Admitted Patient Data Collection and ABS population estimates (HOIST), Centre for Epidemiology and Research, NSW Ministry of Health.

Why is this important? Myringotomy is a surgical procedure in which a tiny incision is created in the eardrum to relieve pressure caused by excessive build-up of fluid in the middle ear ("glue ear"), or to drain pus. The procedure often includes the placement of tiny tubes (grommets) to keep the eardrum open, ventilate the middle ear and allow fluid caught behind the eardrum to drain out. Myringotomy and insertion of grommets is commonly used to improve the hearing of children with otitis media with effusion (OME). OME is a common condition in childhood, following an upper respiratory tract infection and for most, it is a transient problem. Repetitive unresolved episodes of otitis media can lead to perforations of the eardrum and conductive hearing loss. The latter can have a life-long impact, as it may affect speech and language development, which can negatively impact on educational attainment. In Australia in 2008, the prevalence of otitis media among Aboriginal children aged 5-9 years was 5.2 per cent compared with 1.8 per cent for non-Aboriginal children (SCRGSP 2011).

Often Aboriginal children experience a vicious cycle, that may persist throughout childhood, of early exposure, persistent bacterial colonisation and chronic mucosal disease. A systematic review of existing evidence and primary care guidelines for the management of otitis media in Aboriginal and Torres Strait Islander people identified effective primary prevention strategies, including improved nutrition and the home environment, increasing breastfeeding and reducing passive smoking (Couzos 2001) (See also comments and chart on pages 140-143).

Findings: Over the period 2005-2009, in NSW 1,116 Aboriginal children aged less than 15 years had a myringotomy procedure, an age and sex standardised rate of 388.5 per 100,000 children. This is lower than the rate of 518 per 100,000 in the total NSW population aged less than 15 years.

Implications: Although hospitalisation rates for myringotomy are lower for Aboriginal children, the prevalence of otitis media in Aboriginal communities is significantly higher, with more severe impacts (NSWDOH 2006h). The lower rate of myringotomy procedure among Aboriginal children may be due to a combination of reduced access to treatment services and poorer overall environmental health conditions experienced in Aboriginal communities.

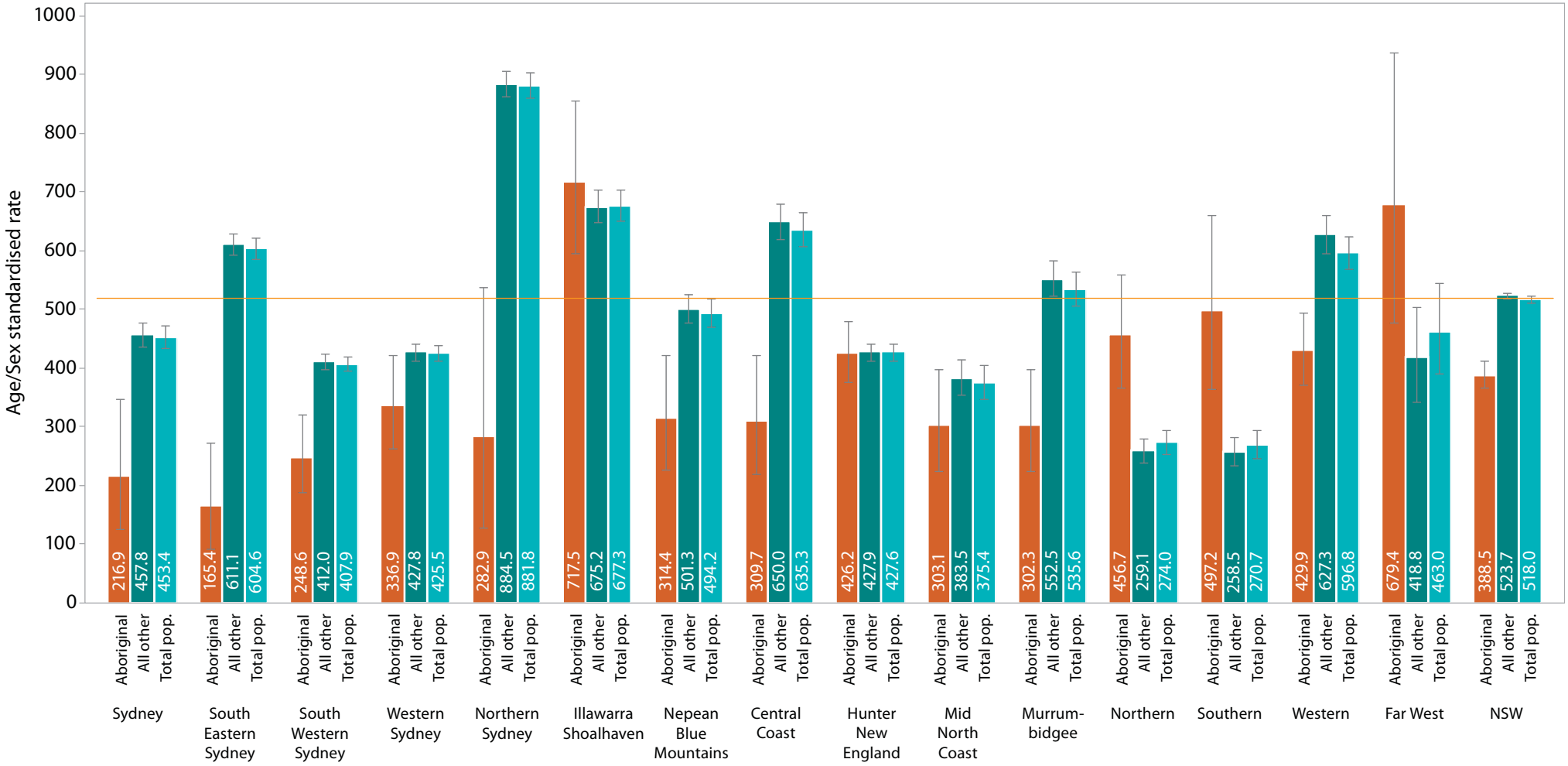
The NSW Health Otitis Media Screening Program for 0-6 year old Aboriginal children was introduced in 2004-05 and provided approximately 60,000 free otitis media checks in the four years to 2007-08. The program focused on early detection, treatment and management of otitis media. An independent evaluation of the program in 2008, identified the need for change, from near-universal screening, to a comprehensive public health approach to otitis media and conductive hearing loss in young Aboriginal children. NSW Health has, with the advice of an expert advisory committee, developed new guidelines to assist local health districts with implementation of a broad public health approach with a strong emphasis on prevention strategies, through modifiable lifestyle risk factors.

What we don't know: What LHDs are doing to increase access to procedures comparable to need.

Aboriginal health: myringotomy procedures

Chart 12-5

Myringotomy rate per 100,000 population, for people aged less than 15 years for Aboriginal, all other and total population by local health district of usual residence, 2005-2009



Source: NSW Admitted Patient Data Collection and ABS population estimates (HOIST), Centre for Epidemiology and Research, NSW Ministry of Health.

Why is this important? Antenatal care provides for the screening of pregnant women, with the aim of detecting and thereby preventing, both maternal and neonatal adverse events. The purpose of antenatal care is to monitor the health of both the mother and baby, provide advice to promote their health, to identify antenatal complications, to identify and manage risk factors in pregnant women and their unborn children, to improve the chances of a healthy mother and child during pregnancy, birth, and early childhood. Antenatal care is recommended during the first trimester and throughout pregnancy. For this indicator, timely initiation is regarded was measured as initiation of the first antenatal visit before 20 weeks of gestation. This indicator has been reviewed by NSW Health and brought forward to the first antenatal visit before 16 weeks. Early antenatal care assesses maternal and fetal well-being, assesses the risk of complications to date during the pregnancy, takes a comprehensive history, discusses smoking behaviour and establishes care options.

The poor health of the Aboriginal population is well documented and this is reflected in perinatal statistics, with rates of pre-term birth, low birth weight and perinatal mortality remaining more than twice that of the non-Aboriginal population over the past decade (Panaretto, Lee *et al*., 2005). High quality antenatal care provides opportunities for risk factor intervention. Research has indicated that late antenatal attendance, maternal malnutrition and high rates of tobacco and alcohol use are associated with poor obstetric outcomes (de Costa and Child 1996). Historically, Aboriginal women have been less likely to visit for antenatal care and check-ups, due to a range of factors, such as access to transport, perceptions that pregnancy was seen as normal and women did not feel sick, or that hospital antenatal visits were seen to be intimidating (Wilson, 2009).

Findings: From 2005 to 2009, 82.2 per cent of Aboriginal mothers had started antenatal care prior to 20 weeks gestation. This represents a considerable improvement since 2002-2004, when the rate was 69.5 per cent and 1993-95 when it was 52.4 (NSWDOH 2006h). Across local health districts, rates of timely initiation of antenatal care ranged from 71.1 per cent in Sydney to 90.9 in Nepean Blue Mountains.

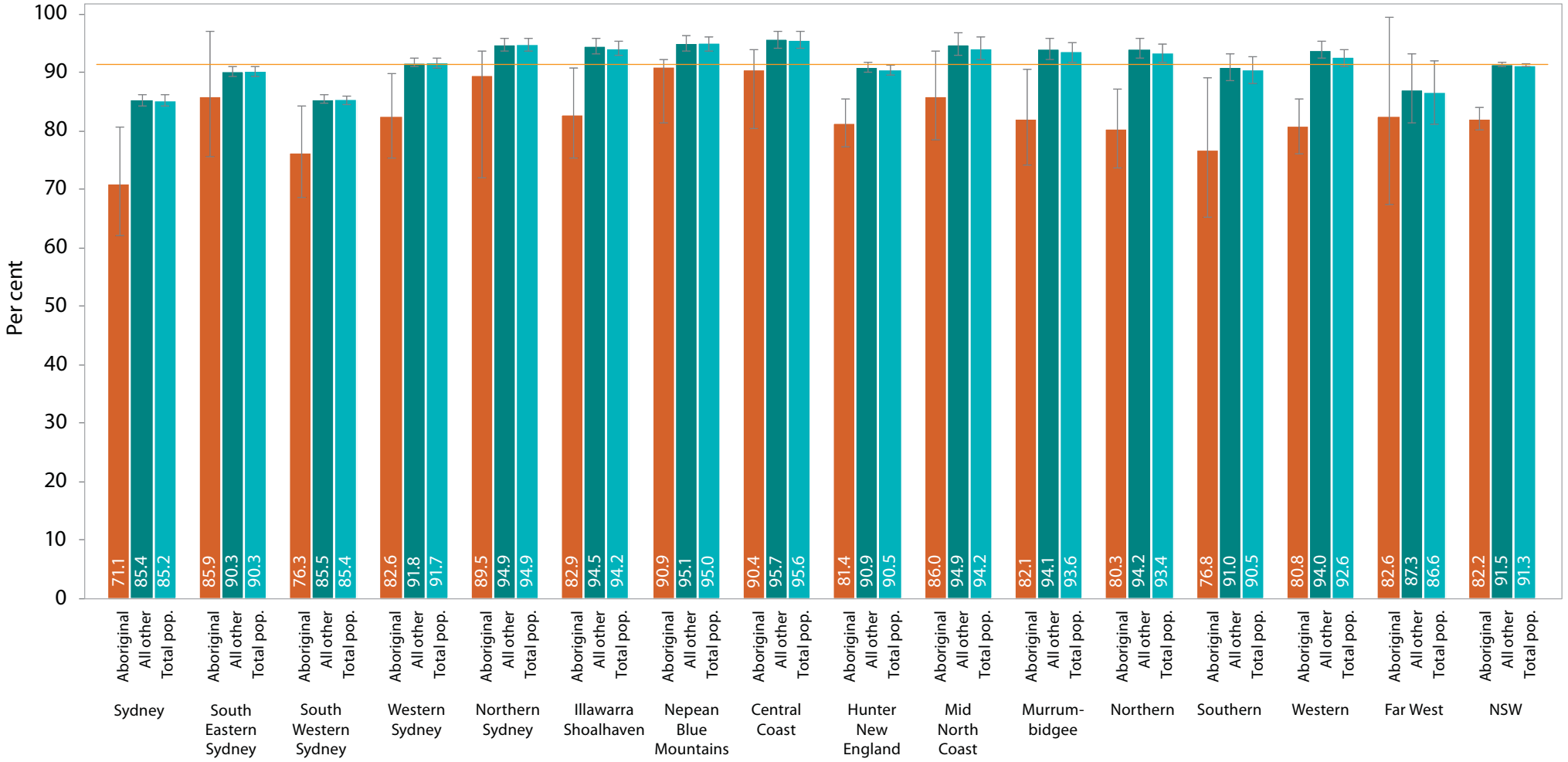
Implications: In NSW, targeted antenatal care for Aboriginal families is largely provided through Aboriginal Community Controlled Health Services and LHDs via Aboriginal Maternal and Infant Health Service (AMIHS). In recognition of the importance of providing Aboriginal mothers with continuity of care, including antenatal and postnatal care, NSW Health established the NSW AMIHS in 2000. In 2001, this AHMIS program was initiated in 14 locations of five former area health services, to ensure the provision of a midwife and Aboriginal health worker to all program participants (NSWDOH 2005d). An evaluation of this program demonstrated excellent outcomes regarding reduced rates of premature births, increased access to antenatal care and increased breastfeeding rates (NSWDOH 2005d; AHMAC 2008; AHMAC 2011a). Based on the evaluation report in 2008, additional funding was secured to increase the number of AMIHS sites from 14 to 31 across the State (http://www.health.nsw.gov.au/news/2008/20080505_01.html).

Further progress is required to make access to early antenatal care equitable for Aboriginal mothers, compared with the total NSW population. The development of community-based services and culturally appropriate models of care have been important and remain a key factor in achieving greater levels of antenatal engagement.

Aboriginal health: antenatal care

Chart 12-6

Percentage of women who have their first antenatal visit before 20 weeks of gestation for Aboriginal, all other and total population by local health district, 2005-2009



Source: NSW Midwives Data Collection (HOIST). Centre for Epidemiology and Research, NSW Ministry of Health.

Why is this important? Smoking is a risk factor for adverse events in pregnancy and is associated with poor perinatal outcomes, such as low birthweight (less than 2,500 grams) (P Laws & Sullivan, 2004), pre-term birth, fetal growth restriction, congenital anomalies and perinatal death. Low birthweight infants are at a greater risk of dying during the first year of life and are prone to ill health in childhood. Smoking during pregnancy is also associated with increased risk of spontaneous abortion and ectopic pregnancy. Obstetric complications such as pre-term labour and ante partum haemorrhage are more common in smoking mothers than non-smoking mothers (PJ Laws & Sullivan, 2005). Nicotine, carbon monoxide and other chemicals in tobacco are passed on to the baby through the placenta, which reduces the oxygen supply to the unborn fetus (AMA, 1999). The negative health effects of tobacco smoking on the unborn fetus may continue after childbirth if one or both of the parents smoke. Passive 'environment' smoking of tobacco around a newborn is considered to be one of the major risk factors for sudden infant death syndrome (SIDS or cot death). Exposure to second-hand smoke in the atmosphere also increases an infant's risk of ear infections and developing asthma (AMA, 1999). Where the mother smokes, harmful chemicals are passed in the breast milk to newborn babies. This increases the risk of respiratory illness, such as bronchitis or pneumonia, during the first year of life ((Winstanley, Woodward, & Walker, 1998)). Interventions for smoking during pregnancy are complex, due to some mothers having a lack of knowledge about the health impacts of smoking, and the need to maintain good relationships between expectant mothers and health professionals (Wood, France, Hunt, Eades, & Slack-Smith, 2008). Besides the traditional predictors of antenatal smoking, interventions for Aboriginal women should also focus on the social environment, and the influences of social networks and partners on the behaviour of individuals (Gilligan, *et al*, 2009).

Findings: In the period 2005–09, approximately half of Aboriginal mothers smoked during pregnancy, four times the rate for non-Aboriginal mothers in NSW. This pattern of significantly higher rate of tobacco smoking during pregnancy for Aboriginal mothers was repeated across all local health districts (Chart 12-13).

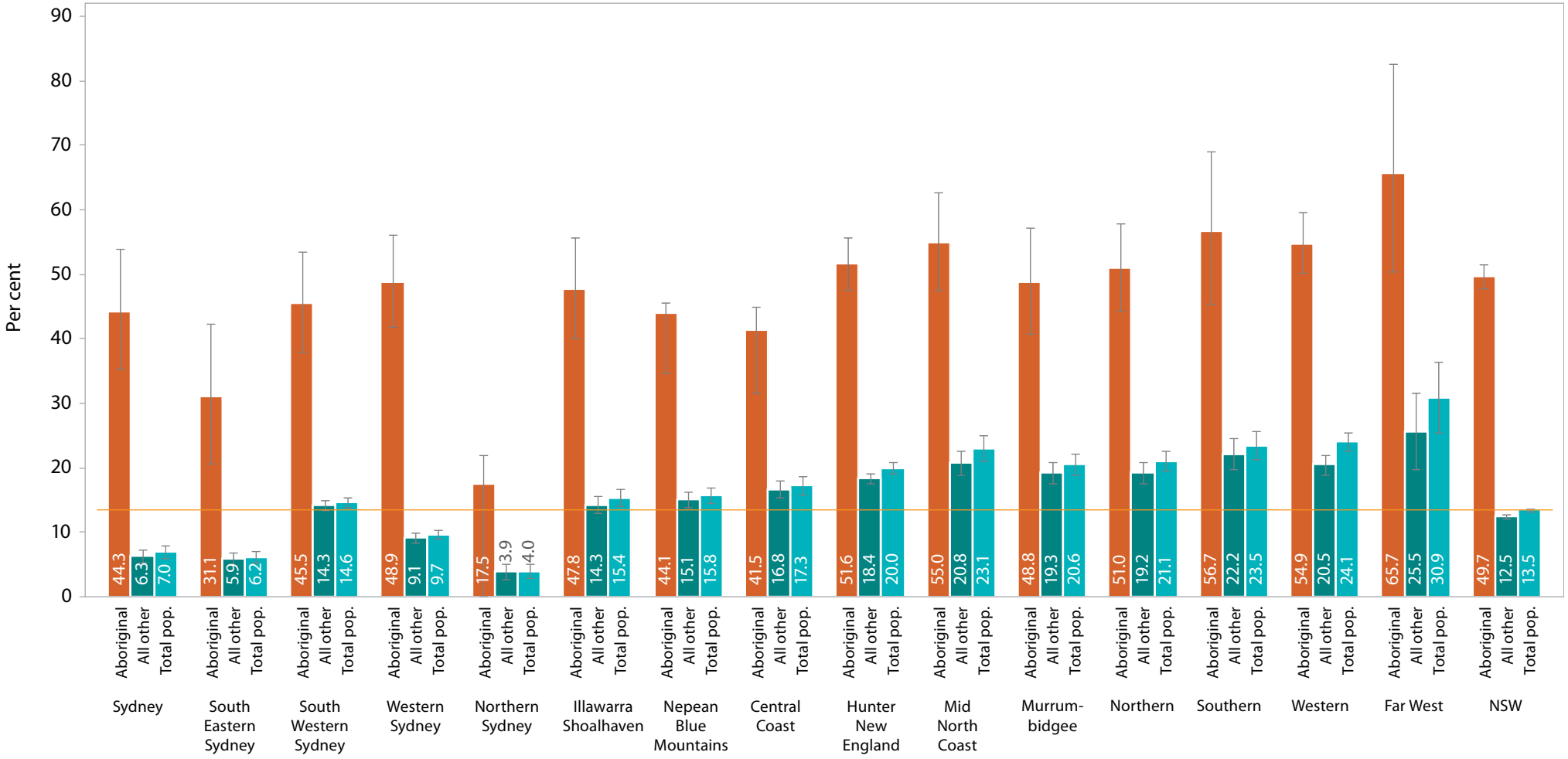
Implications: Smoking by Indigenous mothers is also associated with an almost 20 per cent higher rate of perinatal deaths, which occur at around double the rate for non-Indigenous births (AHMAC, 2011c). Pre-term birth, low birthweight and perinatal deaths were higher for babies born to Aboriginal mothers than to non-Aboriginal mothers, regardless of whether or not the mother was a smoker. These findings indicate that smoking is only one factor associated with these outcomes. Figures (50.5 per cent) reported for NSW 2009, show little improvement in overall prevalence of smoking during pregnancy by Aboriginal mothers since 2005 (55.3 per cent) (CER, 2011b). For Aboriginal women, the prevalence of smoking during pregnancy is similar to that reported for the adult Aboriginal population overall. This suggests the need for new approaches for culturally appropriate and effective health promotion and primary health care interventions specifically related to smoking during pregnancy. Addressing smoking rates in the Aboriginal community is one of five priority areas in the National Partnership Agreement on Closing the Gap in Indigenous Health Outcomes (COAG, 2008c).

What we don't know: What are effective strategies for reducing smoking rates during pregnancy for Aboriginal mothers?

Aboriginal health: maternal smoking during pregnancy

Chart 12-7

Percentage of maternal smoking during pregnancy for Aboriginal women, all other and total population by local health district, 2005-2009



Source: NSW Midwives Data Collection (HOIST). Centre for Epidemiology and Research, NSW Ministry of Health.

Why is this important? Prematurity and birthweight are important neonatal outcomes which are strongly linked with overall lifetime health and well-being. Low birthweight (newborn babies weighing less than 2,500 grams) is associated with premature birth or sub-optimal intra-uterine environments (fetal growth retardation). Low birthweight infants are at a greater risk of dying during the first year of life and are prone to ill health in childhood. Low birthweight babies may also be more vulnerable to illness throughout childhood and into adulthood. There is some evidence that lower birthweights in Aboriginal infants are associated with higher mortality from cardiovascular and renal diseases in adulthood (White *et al*. 2010), and potentially from pulmonary causes in both childhood and adulthood (Hoy & Nicol 2010). Risk factors include socio-economic disadvantage, the weight and age of the mother, the number of babies previously born to the mother, the mother's nutritional status, smoking and other risk behaviours, illness during pregnancy, multiple births and the duration of pregnancy (AIHW 2004b; AMA 2005; ABS 2008a; Eades *et al*., 2008).

Findings: In the period 2005–09, 12.6 per cent of all Aboriginal babies were born before 37 weeks gestation. This compares with 7.2 per cent for non-Aboriginal births. In the period 2005–09, low birthweight was more than twice as common among babies born to Aboriginal mothers than non-Aboriginal babies in NSW (12.3 per cent compared with 6 per cent). This pattern of significantly higher rate of premature births and low birthweight was repeated across all local health districts, with the exception of Northern Sydney which had a very low number of births born to Aboriginal mothers during this period, and therefore there is a low level of statistical significance for this result. Analysis of this data on a nationwide basis has confirmed that Aboriginal low birthweight is associated with smoking during pregnancy, pre-term delivery, multiple births, socio-economic status and other geographical variables (AHMAC, 2011). These relationships appear complex and inter-related.

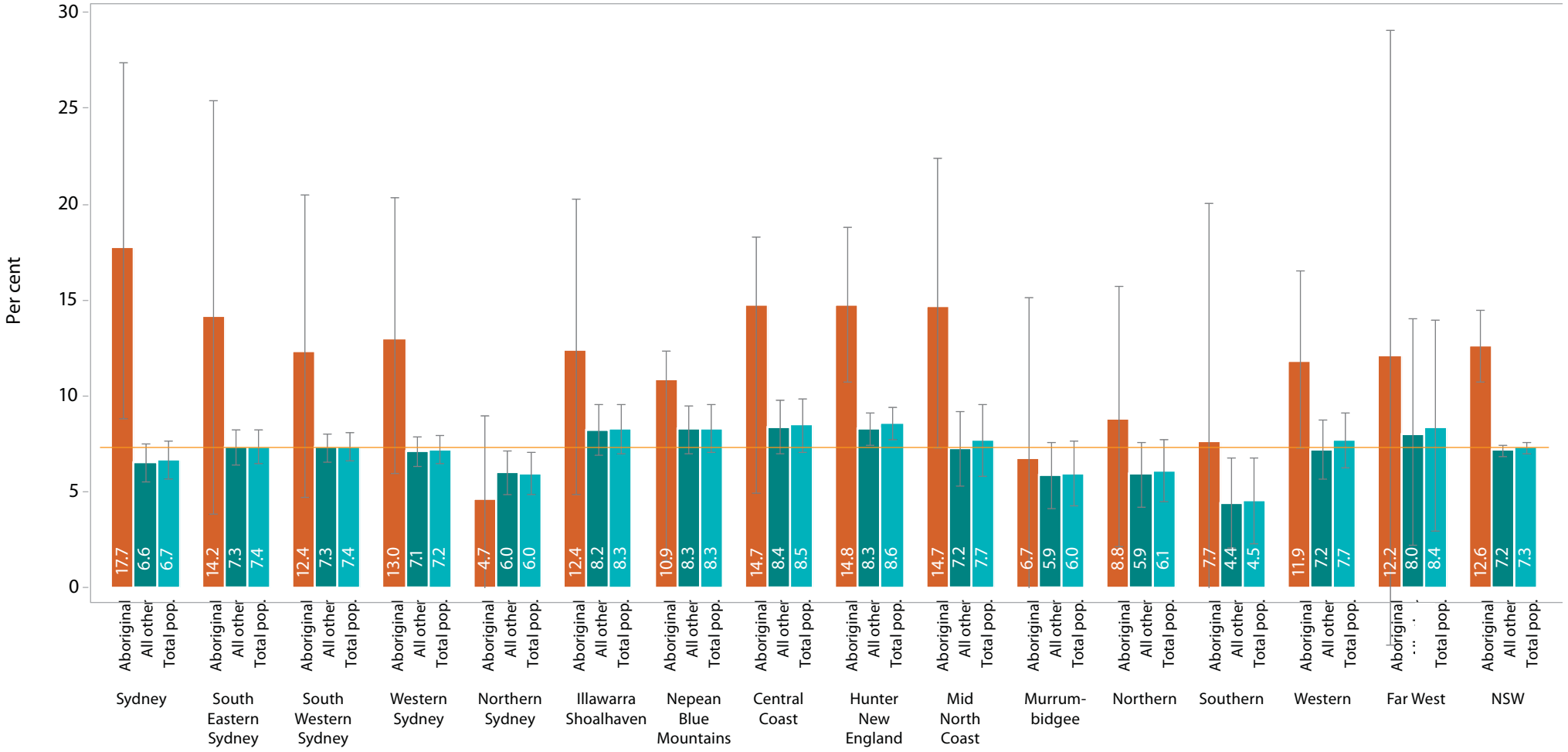
Implications: Efforts to improve the birthweight of Aboriginal children have had limited impact nationally since the early 1990s. Appropriate antenatal care and a healthy environment for the mother can improve the chances that the baby will have a healthy birthweight. Some comprehensive mother and child programs for Aboriginal women in Australia have significantly improved pregnancy outcome measures, including lower rates of low birthweight (Herceg 2005). While improvements in health services, such as antenatal and acute care for pregnant women, are important to reduce the occurrence of pre-term delivery and improve fetal growth during pregnancy, the reasons for premature delivery are not well understood. In addition to health service improvements, other factors are important, such as reducing the prevalence of smoking, improving the nutrition and growth of girls during their childhood and adolescence, nutrition during pregnancy, educational attainment, and the overall social and economic conditions for Aboriginal women and their families.

What we don't know: What are effective strategies for reducing the rate of premature births for Aboriginal women and how can health services be more responsive to the needs of Aboriginal women to ensure best-practice antenatal care is received?

Aboriginal health: pre-term babies (less than 37 weeks)

Chart 12-8

Percentage of pre-term babies (less than 37 weeks of gestation) for Aboriginal women, all other and total population by local health district, 2005-2009

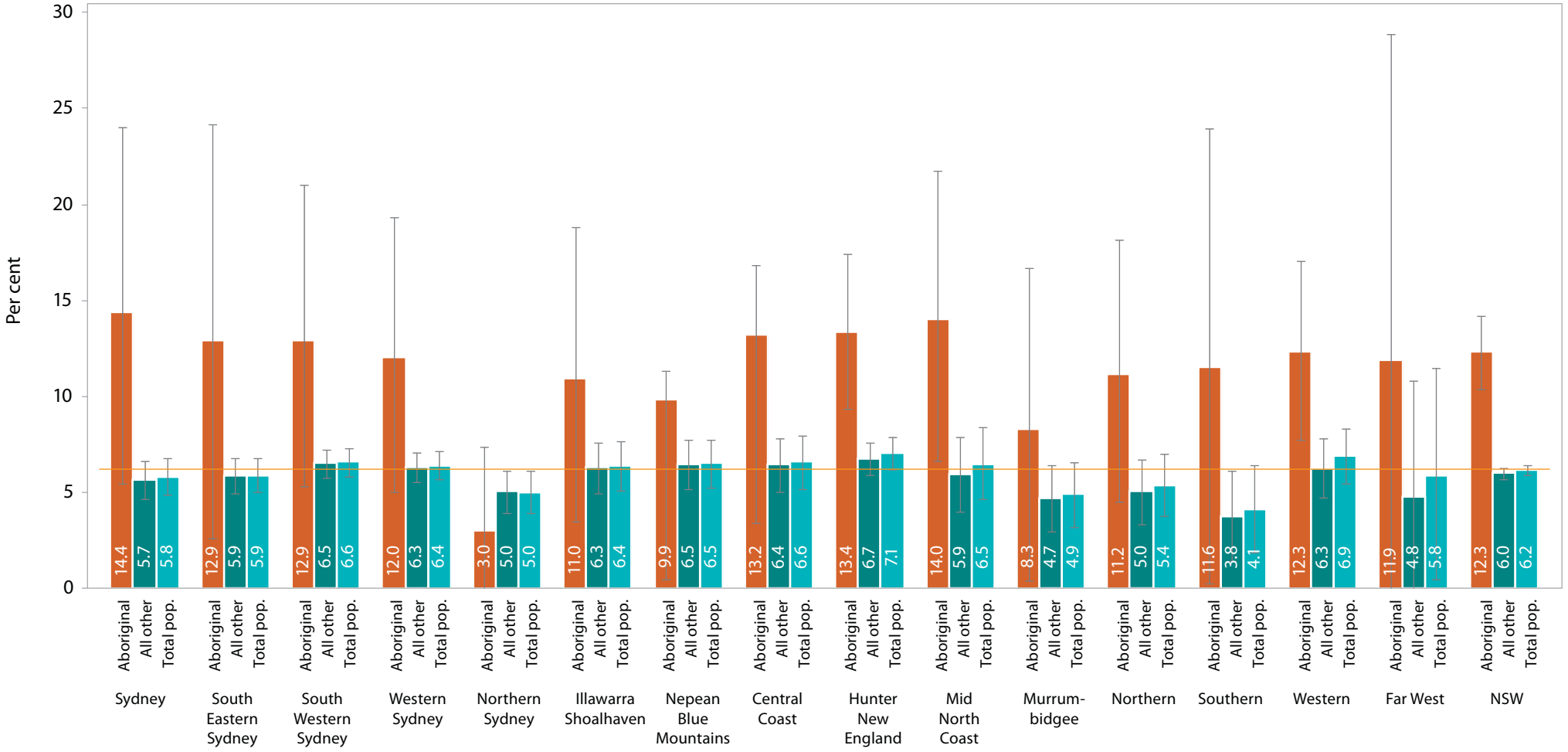


Source: NSW Midwives Data Collection (HOIST). Centre for Epidemiology and Research, NSW Ministry of Health.

Aboriginal health: low birthweight babies (less than 2500 grams)

Chart 12-9

Percentage of low birthweight babies (less than 2500 grams) for Aboriginal women, all other and total population by local health district, 2005-2009



Source: NSW Midwives Data Collection (HOIST). Centre for Epidemiology and Research, NSW Ministry of Health.

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Why is this important? Cancer was the second leading cause of death among Aboriginal people in the period 2003-2007, accounting for 21 per cent of all Aboriginal deaths in NSW compared with 29 per cent of deaths in the non-Aboriginal population (CER, 2011). Historically, statistics on Aboriginal Australians, including cancer statistics, have been limited across a range of health issues due to poor identification and under-reporting of Aboriginal people in health-related administrative data collections. The reasons for this are complex (AIHW, 2010b).

System-wide initiatives have improved the collection of Aboriginal status on health administrative data sets (NSW DOH 2000) and these have now flowed on to cancer statistics. A recent quality review of the NSW Central Cancer Registry (CI-NSW, 2011) confirmed that cancer incidence and mortality data are of sufficient quality to report by Aboriginal status from the registry, enabling us to report with confidence on the impact of cancer for Aboriginal people in NSW for the first time. This means that cancer in Aboriginal people in NSW can now begin to be assessed in terms of its priority relative to other health issues.

Findings: For the period 1999-2007 prostate and breast cancers were the most commonly diagnosed cancers in Aboriginal males and females respectively, followed by lung cancer. Lung cancer was the most commonly diagnosed cancer overall (Charts 12-10 to 12-13).

Aboriginal females had significantly higher rates of lung, cervix and head and neck cancers than non-Aboriginal females, with rates that were double or more for Aboriginal females compared to all NSW females for these cancers.

Similarly, Aboriginal males had significantly higher rates of lung and head and neck cancers, plus stomach cancer. Aboriginal males incidence was 70 per cent or higher than all NSW males for cancers of the head and neck, lung, and stomach.

In addition, despite lower incidence from prostate cancer, mortality was almost 90 per cent higher in Aboriginal than non-Aboriginal males.

Aboriginal females also had significantly higher mortality from breast, pancreas, cervix, head and neck, and kidney cancers. Despite the similar incidence of breast cancer in Aboriginal and non-Aboriginal females, Aboriginal females had 50 per cent higher mortality. For cervical cancer, this was even more marked, with Aboriginal females having a mortality rate almost five times that of non-Aboriginal females.

Implications: A large proportion of the higher mortality for Aboriginal people from cancers can be explained by differences in the degree of spread of the cancer at diagnosis, smoking rates and participation in national screening programs.

Aboriginal people have lower rates of localised cancer and correspondingly higher rates of regional and distant cancers. However, not all the excess Aboriginal cancer mortality is due to higher incidence, nor is all of it explained by higher proportions of late-stage cancers. This is highlighted by lower Aboriginal incidence of localised cancers overall, yet significantly higher mortality from localised cancer.

Self-reported smoking rates vary considerably between: i) Australian and NSW Aboriginal population; and ii) between NSW Aboriginal population and NSW non-Aboriginal population. In Australia in 2008, almost half (47 per cent) of the Aboriginal population aged 15 years and over* were reported to be daily smokers (ABS 2010a). This compared with 33.9 percent for NSW Aboriginal population aged 16 years and over* (CER 2010b). In NSW self-reported data from *NSW Population Health Survey* 2006–2009 showed that one third (33.9 percent) of the NSW Aboriginal population were daily smokers (CER 2010b), while in 2010, 15.8 per cent of the total NSW adult population were daily smokers (CER 2011a).

Breast and cervical screening rates in Aboriginal females remain consistently lower than in their non-Aboriginal counterparts. For 2007-2008 BreastScreen participation in Aboriginal females was 36 per cent compared to 54.8 per cent in non-Aboriginal females (AIHW 2010c). Likewise Aboriginal females have lower cervical screening participation rates, with estimates that as low as 37 per cent are adequately screened (AIHW 2010d). This compares to the national rate of 61.2 per cent for all females in 2007-2008 (Condon et al. 2003).

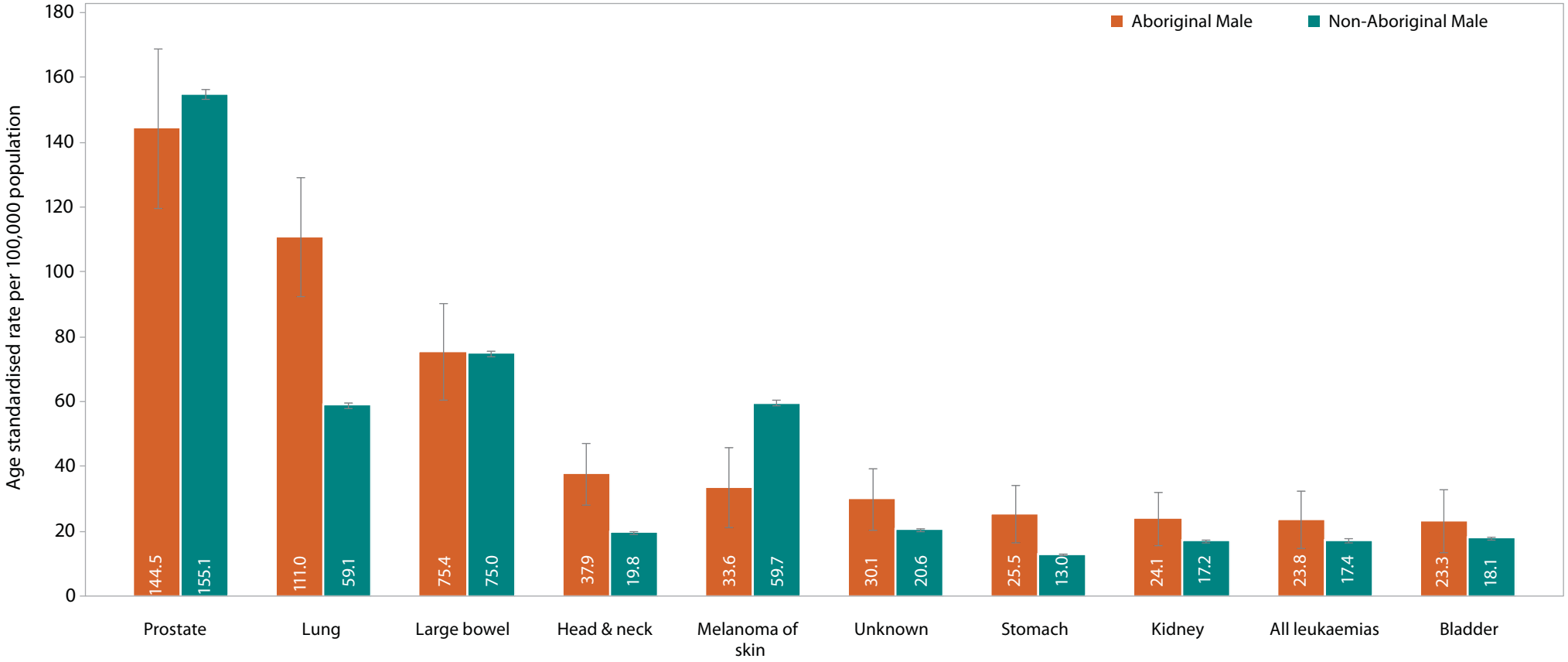
What we don't know: Why are Aboriginal people more likely to present with regional or advanced disease? Why do Aboriginal people with localised disease have poorer outcomes than their non-Aboriginal counterparts? What is the most effective strategy for reducing smoking rates in the Aboriginal population?

* Exact comparisons are not strictly possible due to small differences in the age range used by the ABS and the *NSW Population Health Survey*

Aboriginal health: cancer incidence males

Chart 12-10

Age-standardised cancer incidence rates (per 100,000 population) for Aboriginal and non-Aboriginal males for top 10 cancers in NSW, 1999-2007

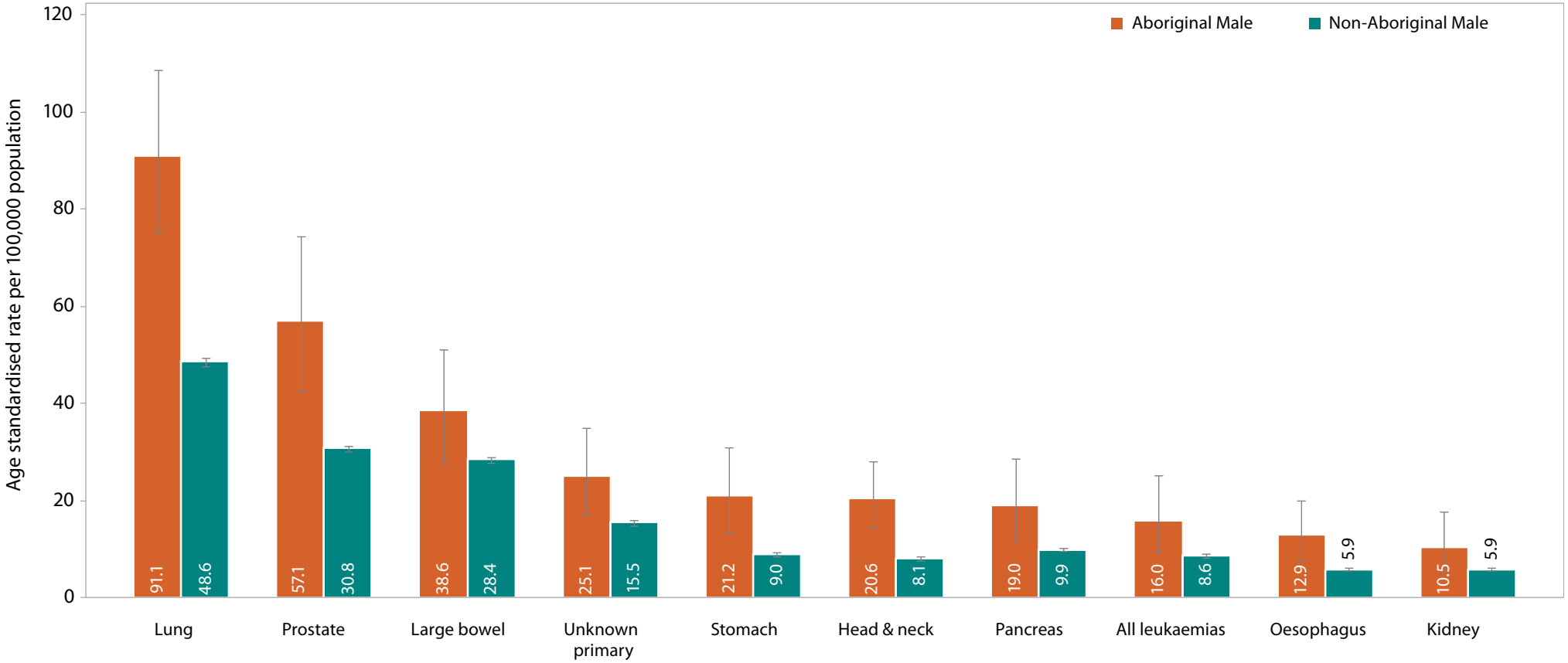


Source: Cancer Institute NSW.

Aboriginal health: cancer deaths males

Chart 12-11

Age-standardised cancer death rates (per 100,000 population) for Aboriginal and non-Aboriginal males for the top 10 cancers in NSW, 1999-2007

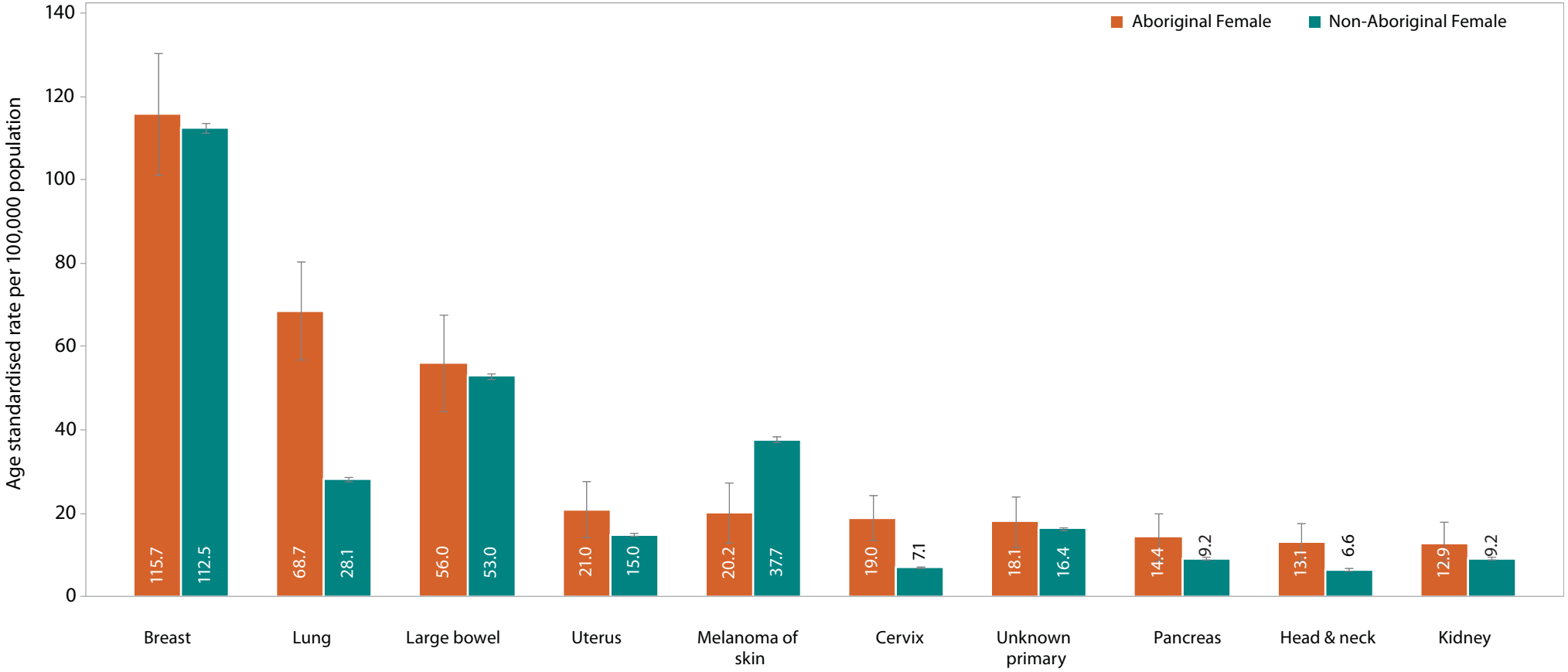


Source: Cancer Institute NSW.

Aboriginal health: cancer incidence females

Chart 12-12

Age-standardised cancer incidence rates (per 100,000 population) for Aboriginal and non-Aboriginal females for the top 10 cancers in NSW, 1999-2007

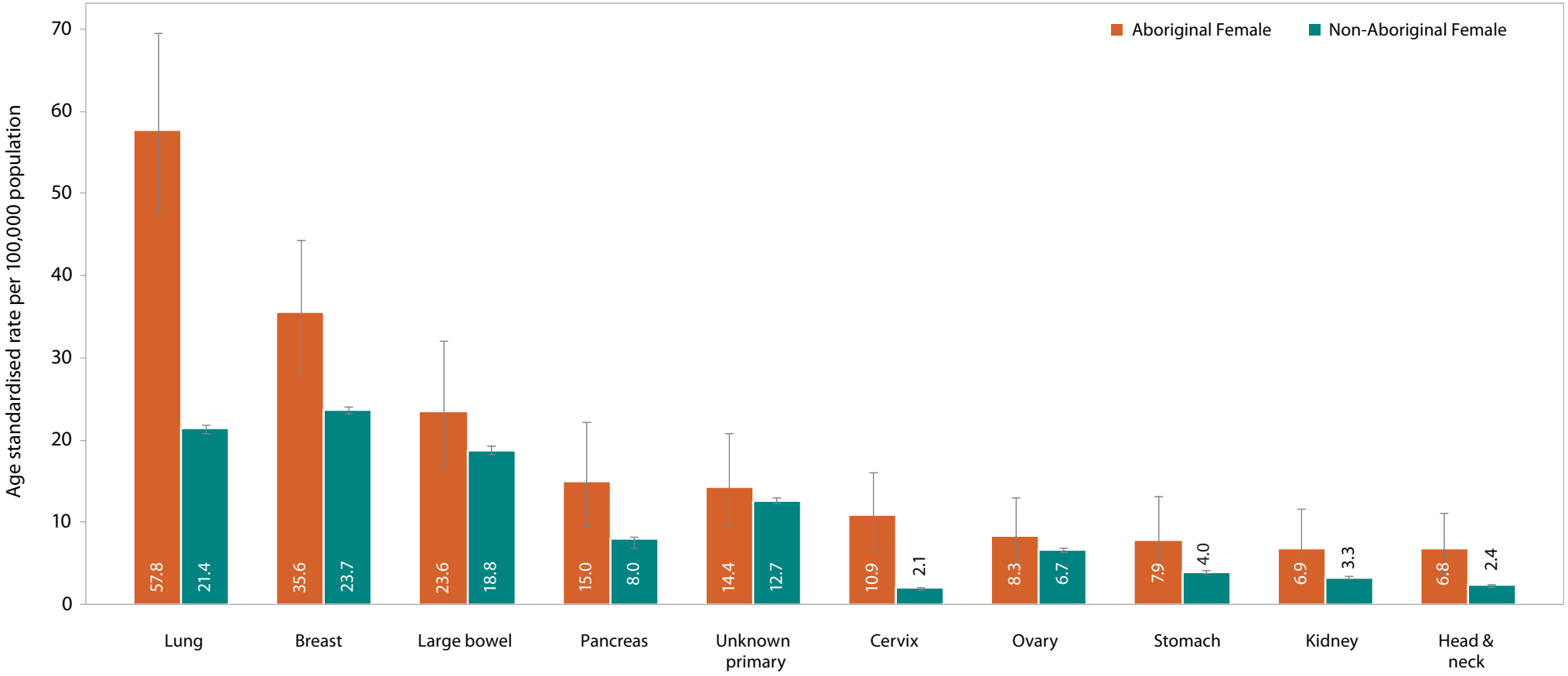


Source: Cancer Institute NSW.

Aboriginal health: cancer deaths females

Chart 12-13

Age-standardised cancer deaths rates (per 100,000 population) for Aboriginal and non-Aboriginal females in the top 10 cancers in NSW, 1999-2007



Source: Cancer Institute NSW.

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There is evidence that hospitals treating higher volumes of people for complex surgical oncology procedures have better outcomes than those hospitals performing lower volumes of surgery. This is particularly so for mortality, although length of stay and emergency re-admission also demonstrate a relationship with surgical volume for some procedures (Begg, Cramer, Hoskins, & Brennan, 1998; Birkmeyer *et al*., 2002; Birkmeyer *et al*., 2003). However, these relationships are variable and not as strong or consistent as the relationship with mortality (Goodney PP, Stukel TA, & Lucas FL *et al*, 2003). Mortality is most often measured as 30-day post-operative mortality. Improved long-term survival is also associated with surgery in higher volume hospitals (Birkmeyer JD, Sun Y, Wong SL, & Stukel TA, 2007; Fong, Gonen, Rubin, Radzyner, & Brennan, 2005).

The contribution of quality of care factors such as adherence to recommended practices, or of organisational characteristics for post-surgical care, such as availability of, and staffing in ICU, specialised nursing staff, nurse-to-patient ratios, and availability of allied health professionals, is unknown in the NSW setting. There is evidence for their contribution to improved outcomes for a range of procedures, including cancer resections (Dimick JB, 2005; Elixhauser A, Steiner C, & Fraser I, 2003; Joseph B, Morton JM, & Hernandez-Boussard T *et al*, 2009). There is also evidence that improved outcomes may not be specific to high volumes performed for the same procedure – but rather to the shared structure and process characteristics of hospitals that undertake a high volume of multiple complex procedures (Urbach DR & Baxter NN, 2004).

In order to investigate the relationship between surgical volume and outcomes in the NSW setting, the Cancer Institute NSW selected the ICD10AM procedure codes for upper gastro-intestinal, lung, colon and rectal cancers. Surgery for these tumour types is complex and only those procedures performed with curative intent were included in the analysis.

Chartbook 2010 presents data for a number of cancer surgical procedures, including upper gastrointestinal cancers (oesophagus, pancreas, stomach), lung, colon and rectal. Based on a join point analysis investigating the relationship between 30-day hospital mortality and hospital volume, the Cancer Institute NSW identified the threshold at which volume was associated with increased mortality for these cancers. Data was sourced from the NSW Central Cancer Registry linked to the NSW Admitted Patient Data Collection for the years 2005-2008. The volumes of procedures undertaken by hospitals in these four years were averaged, to produce an average annual number of procedures for each facility. Results are reported by NSW Ministry of Health hospital peer groups.

Why is this important? Surgical resection is the recommended treatment for localised pancreatic, gastric and oesophageal cancers with no distant metastases or other contra-indication to resection, such as patient co-morbidity, or anatomical location (National Comprehensive Cancer Network, 2011a, 2011b, 2011c).

Resection for these cancers is complex and carries a high risk of post-operative morbidity and mortality. These procedures have therefore been subject to considerable scrutiny to develop methods of measuring and improving post-operative outcomes.

An increasing body of evidence documents the inverse relationship between operative mortality and hospital surgical volume for these cancers (Begg, Cramer, Hoskins, & Brennan, 1998; Birkmeyer, Siewers, & Finlayson, 2002; Dimick, Wainess, Upchurch, Iannettoni, & Orringer, 2005; Halm EA, Lee C, & Chassin MR, 2002; Lauder CIW, Marlow NE, & Maddern GJ *et al*, 2010). The magnitude of this relationship varies by procedure, but is particularly strong for resections of the pancreas and oesophagus (Begg, *et al*., 1998; Birkmeyer, *et al*., 2002; Halm EA, *et al*., 2002; Lauder CIW, *et al*., 2010; McPhee JT, Hill JS, & Whalen GF *et al*, 2007) and has also been found for gastric resections (Birkmeyer, *et al*., 2002; Smith DL, Elting LS, & Learn PA *et al*, 2007; Smith JK, McPhee JT, & Hill JS *et al*, 2007). The absolute differences in adjusted operative mortality (in-hospital mortality or within 30 days) have been estimated at greater than 5 percentage points for pancreatic and oesophageal resections and 2-5 percentage points for gastrectomy (Birkmeyer, *et al*., 2002).

Treatment in high-volume centres also confers a long-term survival advantage for oesophageal and pancreatic cancer surgery in particular (Birkmeyer JD, Sun Y, Wong SL, & Stukel TA, 2007; Fong, Gonen, Rubin, Radzyner, & Brennan, 2005). Birkmeyer et. al demonstrated that the effect of lower volume to higher volume hospital varies by procedure, but is most pronounced for oesophageal cancer. The probability of surviving five years after oesophageal resection was 17 per cent in low-volume hospitals, compared to 34 per cent in high-volume (Birkmeyer JD, *et al*., 2007). Smaller but substantial differences in five-year survival were observed in low- and high-volume hospitals for gastric (26 per cent compared to 32 per cent) and pancreas (11 per cent compared to 16 per cent) cancer resections (Birkmeyer JD, *et al*., 2007).

Standards for delivering thoracic and hepto-panctreatic-bilary (HPB) cancer surgery have been developed for Ontario, Canada, by Cancer Care Ontario. The consensus-based standards include hospital volume criteria, as well as other hospital, training and organisational criteria for defining level 1 and level 2 hospitals. The target set for oesophagectomy is a minimum of 20 per year for a level 1 hospital and 7 for a level 2 hospital (Sundaresan *et al*., 2007). For HPB cancer resections, a target of 50 resections, including a minimum of 20 pancreatectomies has been set (Marcaccio, Langer, Rumble, Hunter, & Oncology, 2006). In the 2009/10 financial year, nearly 90 per cent of pancreatectomies were performed in a designated HPB centre, with five of the nine designated hospitals meeting the target volume (Cancer Quality Council of Ontario, 2012).

In Queensland, the number of public hospitals performing oesophagectomies for cancer has decreased from 13 in the 2000 to 2004 period to six in the 2005 to 2009 period (Zarate, Colquist, & Smithers, 2011a). Six out of the seven public hospitals that stopped doing oesophagectomies were in regional areas. The number of private hospitals performing oesophagectomies has remained relatively constant (11 and 10 in the early and later period, respectively). The effect of these changes on patient outcomes for oesophagectomy requires evaluation. For pancreaticoduodenectomy, Queensland hospitals with a low (<3) annual volume have been found to have significantly higher in-hospital mortality (8.1 per cent) compared to high (>6) volume hospitals (1.4 per cent) between 2000-2007 (Zarate, Colquist, & Smithers, 2011b).

Findings:

Oesophagus

For surgery for oesophageal cancer, the following groupings were used:

- three or less = 'low volume hospitals'
- greater than three, up to and including six procedures a year = 'volume at which there was a trend for lower mortality' in NSW data.

Of the 32 hospitals in NSW which performed oesophageal resection for cancer in the period 2005-2008, only five (16 per cent) performed *more than six procedures* on average each year. Two of these hospitals were in the hospital peer grouping Principal Referral A, one in Principal Referral B, and two were private hospitals. Eight hospitals

(25 per cent) performed *above three and up to six procedures* during this period. The vast majority – 19 (59 per cent) performed on average *three or less* procedures annually.

Pancreas

For surgery for pancreatic cancer the following groupings were used:

- two or less = the volume below which there was a trend for higher post-operative mortality in NSW data
- greater than two, up to and including six procedures a year = volume which international evidence indicates is low-moderate volume.

Of the 37 hospitals in NSW which performed pancreatic resection for cancer in the period 2005-2008, only six (16 per cent) performed *more than six procedures* on average each year. Four of these hospitals were in the hospital peer grouping Principal Referral A, one in Principal Referral B, and one was a private hospital. Sixteen hospitals (43 per cent) performed *greater than two and up to six procedures* annually during this period. There were still 15 (41 per cent) hospitals undertaking *two or less* procedures annually on average during this period.

Stomach

For surgery for stomach cancer a grouping of *up to and including six procedures a year* was used to identify 'low volume' hospitals. There was no significant trend towards lower mortality in NSW data, therefore this value was based on cut-offs in international literature.

Of the 59 hospitals undertaking gastric resections for cancer in the period 2005-2008, only 12 (20 per cent) performed *more than six procedures* on average each year. Eight of these hospitals were in the hospital peer grouping Principal Referral A, one in Principal Referral B, and three were Private hospitals. The remaining 47 (80 per cent) hospitals performed *fewer than six procedures* annually on average during this period. Twenty-two (47 per cent) of those hospitals under the threshold performed an average of *one or fewer* procedures annually over the period. Some of these may, however, be for emergency presentations.

Implications: The evidence demonstrating the inverse relationship between surgical volume and outcomes implies that the concentration of high-risk oncological procedures in specialist centres is a logical next step for some cancers. The overseas experience shows that this has many potential advantages; most notably improved outcomes and reduced mortality for patients (Dudley RA, Johansen KL, Brand R, Rennie DJ, & Milstein A, 2000; Finks JF, Osborne NH, & Birkmeyer JD, 2011; Gasper WJ, Glidden DV, & al, 2009; Hollenbeck BK, Dunn RL, & Miller Dc *et al*, 2007; McPhee JT, *et al*., 2007; Urbach DR, Bell CM, & Austin PC, 2003). The concentration of surgery in specialist centres also facilitates better monitoring of outcomes via improved statistical precision. This enables systematic monitoring which in turn promotes accountability in health services and enables quality improvement initiatives at the service level (Birkmeyer JD, 2000). For stomach cancer, some procedures may continue to be performed outside of designated centres, due to emergency presentations, although even this may raise key questions.

Decisions around consolidation of cancer surgery need to balance the needs of NSW residents in terms of access to services with goals to improve cancer outcomes across the health system.

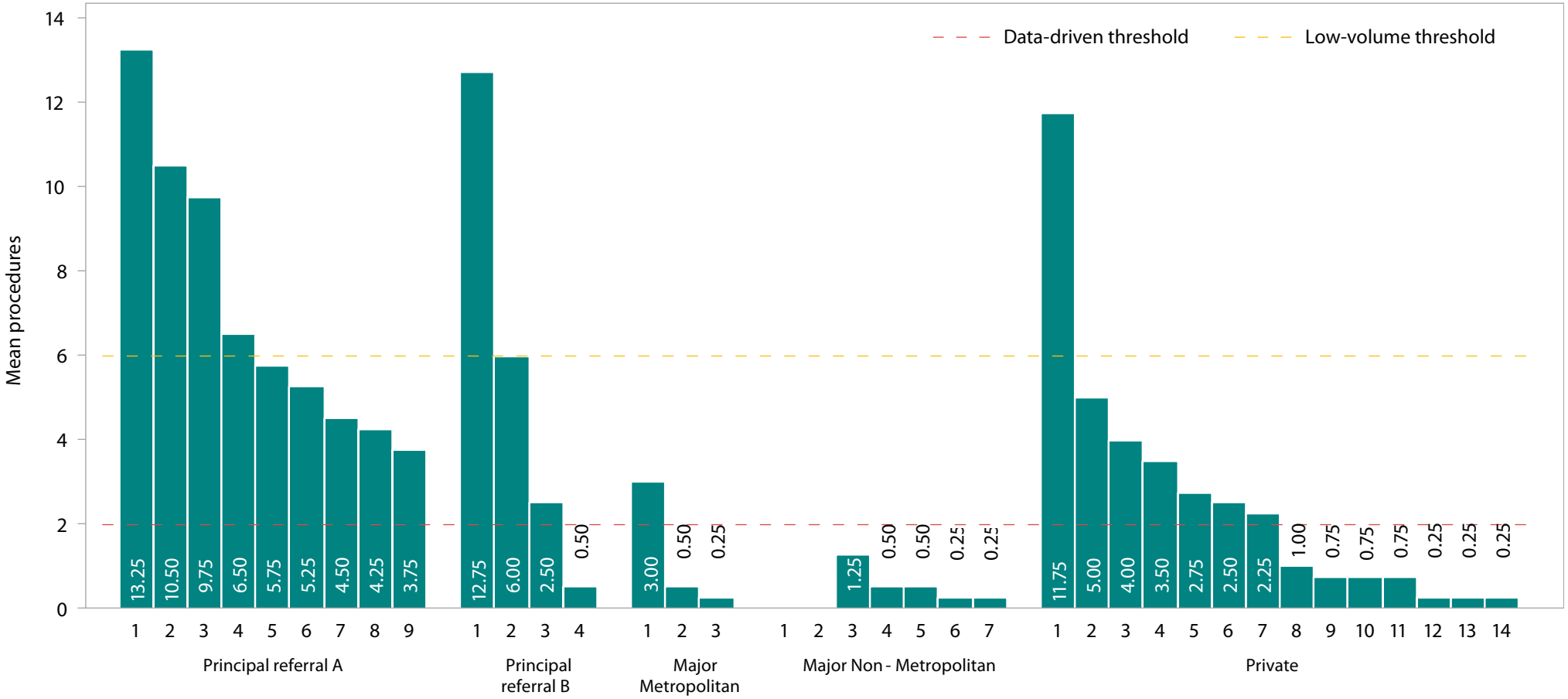
What we don't know: In the NSW setting the relative importance of experience of the operating surgeon has not yet been defined. This relationship has not been extensively studied, but there is evidence that surgeon volume accounts for a significant proportion of the effect of hospital volume. Approximately half of the effect of hospital volume on 30-day operative mortality for pancreas and oesophagus cancer can be attributed to the institution and half to the individual surgeon's case volume (Birkmeyer *et al*., 2003).

Apart from surgeon volume, there are also other mechanisms that are likely to underlie better outcomes for patients resected in high-volume hospitals. These may include better detection and treatment of recurrent cancer and better treatment for co-morbid diseases (Birkmeyer, Sun, Wong, & Stukel, 2007). The risks outlined are on a continuum and threshold caseloads are indicative of changing levels of risk.

Pancreatectomy volumes

Chart 13-1

Annual mean procedure volume for pancreatectomies at NSW facilities by hospital peer group, 2005-2008



Source: Cancer Institute NSW.

Notes: Pancreatic resections for primary invasive pancreatic, ampullary and periampullary cancer (ICD-O-3 C25, C24, C17.0).

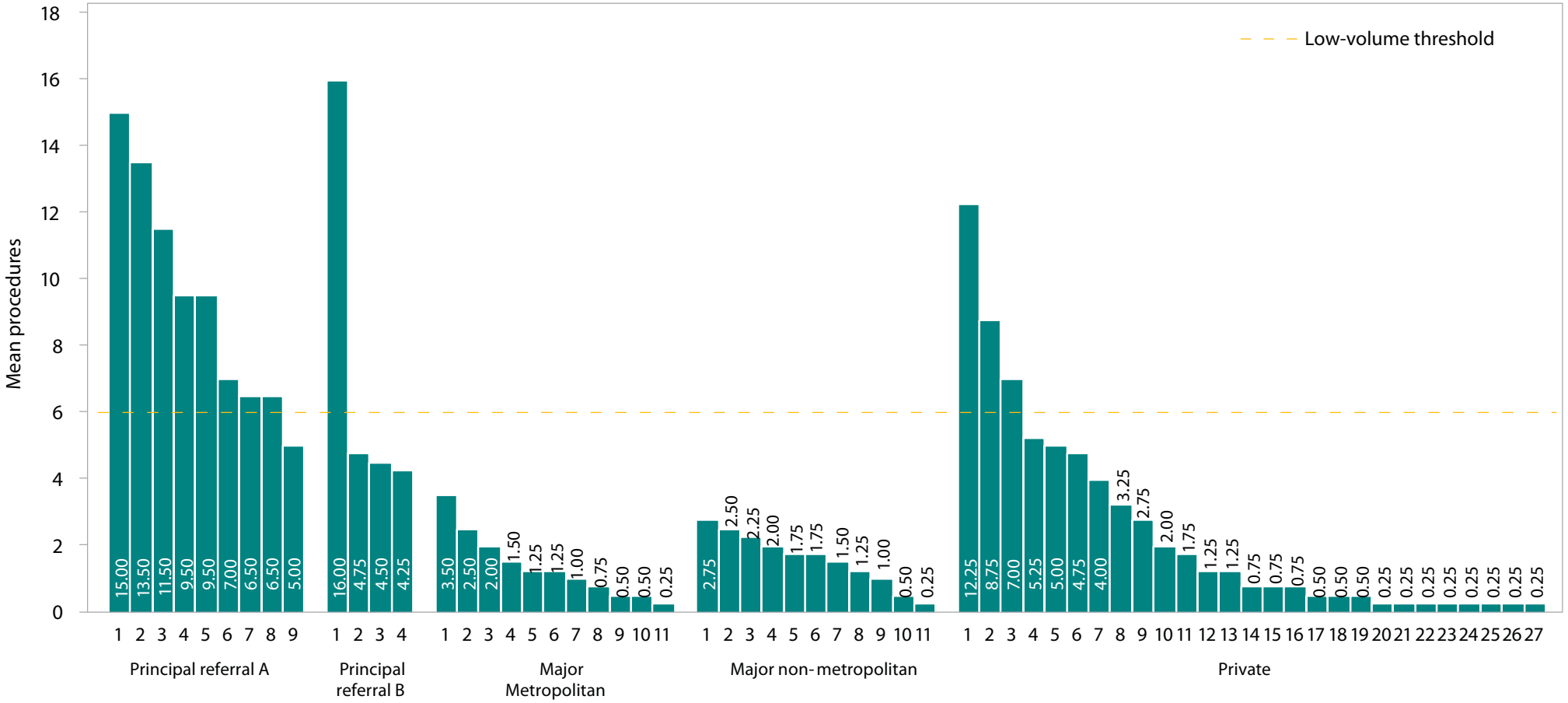
'Data driven threshold' defines a low-volume hospital (and is also consistent with international low-volume definitions).

'Low-volume threshold' is the point at which there is a trend for lower mortality.

Gastrectomy volumes

Chart 13-2

Annual mean procedure volume for gastrectomies at NSW facilities by hospital peer group, 2005-2008

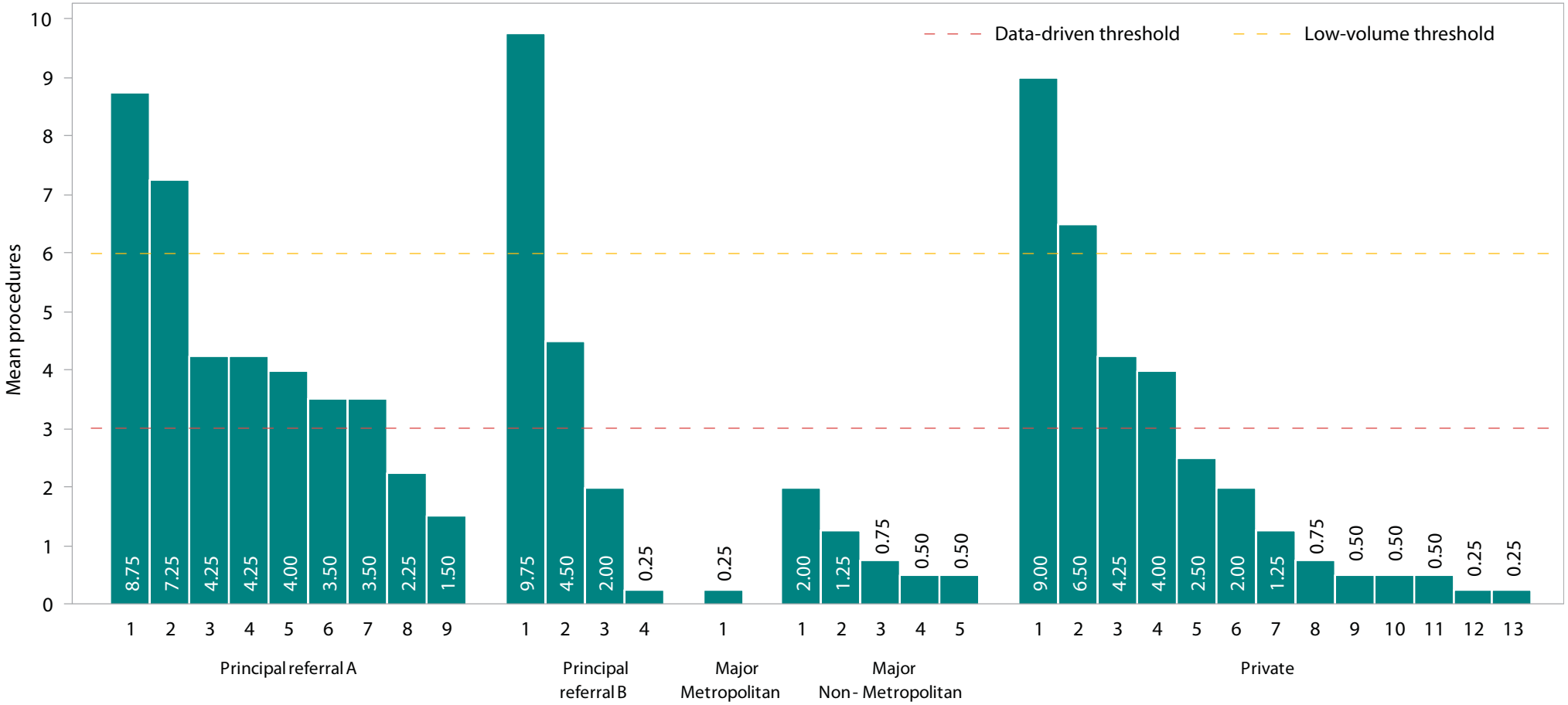


Source: Cancer Institute NSW.
Notes: Stomach resections for primary invasive stomach or oesophagus cancer (ICD-O-3 C16, C15); Peer group 'Other' excluded.
'Low-volume threshold' is the point at which there is a trend for lower mortality.

Oesophagectomy volumes

Chart 13-3

Annual mean procedure volume for oesophagectomies at NSW facilities by hospital peer group, 2005-2008



Source: Cancer Institute NSW.
Notes: Oesophagus resections for primary invasive oesophagus or stomach cancer (ICD-O-3 C15, C16); Peer group 'Other' excluded.
'Data driven threshold' defines a low-volume hospital (and is also consistent with international low-volume definitions).
'Low-volume threshold' is the point at which there is a trend for lower mortality.

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Why is this important? Surgical resection is the recommended treatment for non-small cell lung cancers which have no regional or distant spread or other contra-indication to resection, such as patient co-morbidity or anatomical location (Australian Cancer Network, 2004; National Comprehensive Cancer Network, 2011).

Resection for these cancers is complex and carries a high risk of post-operative morbidity and mortality. These procedures have therefore been subject to considerable scrutiny to develop methods of measuring and improving post-operative outcomes.

An increasing body of evidence documents the inverse relationship between hospital surgical volume and outcomes such as post-operative mortality for many cancers. Whilst this association is strong for cancers such as upper gastro-intestinal tract (Begg C, Cramer D, Hoskins WJ, & Brennan MF, 1998; Birkmeyer JD, Siewers AE, & Finlayson EVA *et al*, 2002), the relationship is less consistent for lung cancer, with some studies demonstrating a strong association (Bach PB *et al*., 2001), and others either no demonstrated relationship (Begg C, *et al*., 1998; Simunovic M, Rempel E, & Theriault ME *et al*, 2006), or lower magnitude of effect compared to other cancers (Birkmeyer JD, *et al*., 2002).

Despite the less certain association of volume with mortality for lung cancer, treatment in high-volume centres is associated with a significantly lower rate of complications post-operatively (Bach PB, *et al*., 2001). It also confers a long-term survival advantage for lung cancer, with a relatively large risk difference estimated for lung resection. The probability of surviving five years ranged from 33- 38 per cent after resection in low volume hospitals compared to 44 per cent after resection in high-volume hospitals (Bach PB, *et al*., 2001; Birkmeyer JD, Sun Y, Wong SL, & Stukel TA, 2007).

Findings: For surgery for lung cancer, a threshold of *up to and including 15 procedures a year* was used to identify 'low-volume' hospitals. There was a slight trend towards lower mortality in hospitals performing more than 15 procedures annually, but a trend to higher mortality was not evident below this cut point. International literature does not use any consistent annual caseload threshold for lung cancer surgery. Of the 28 hospitals undertaking resections for lung cancer in the period 2005-2008, only 11 (39.3 per cent) performed *more than 15 procedures* on average each year. Five of these hospitals were in the hospital peer grouping Principal Referral A, one in Principal Referral B, and four were private hospitals. In total 17 hospitals (60.7 per cent) performed *15 or fewer procedures*, and of these six (35.3 per cent) performed *two or fewer* on average each year.

Implications: Whilst the evidence for a volume outcome relationship for lung cancer surgery is not as compelling as for other cancers, this may relate, in part, to the volume of procedures performed by each surgeon performed across different facilities. Lung resections may be performed at different facilities or for indications other than cancer, thereby increasing the volume of procedures each institution performs. This is contrary to cancers such as oesophageal resections, which are performed almost universally for cancer treatment.

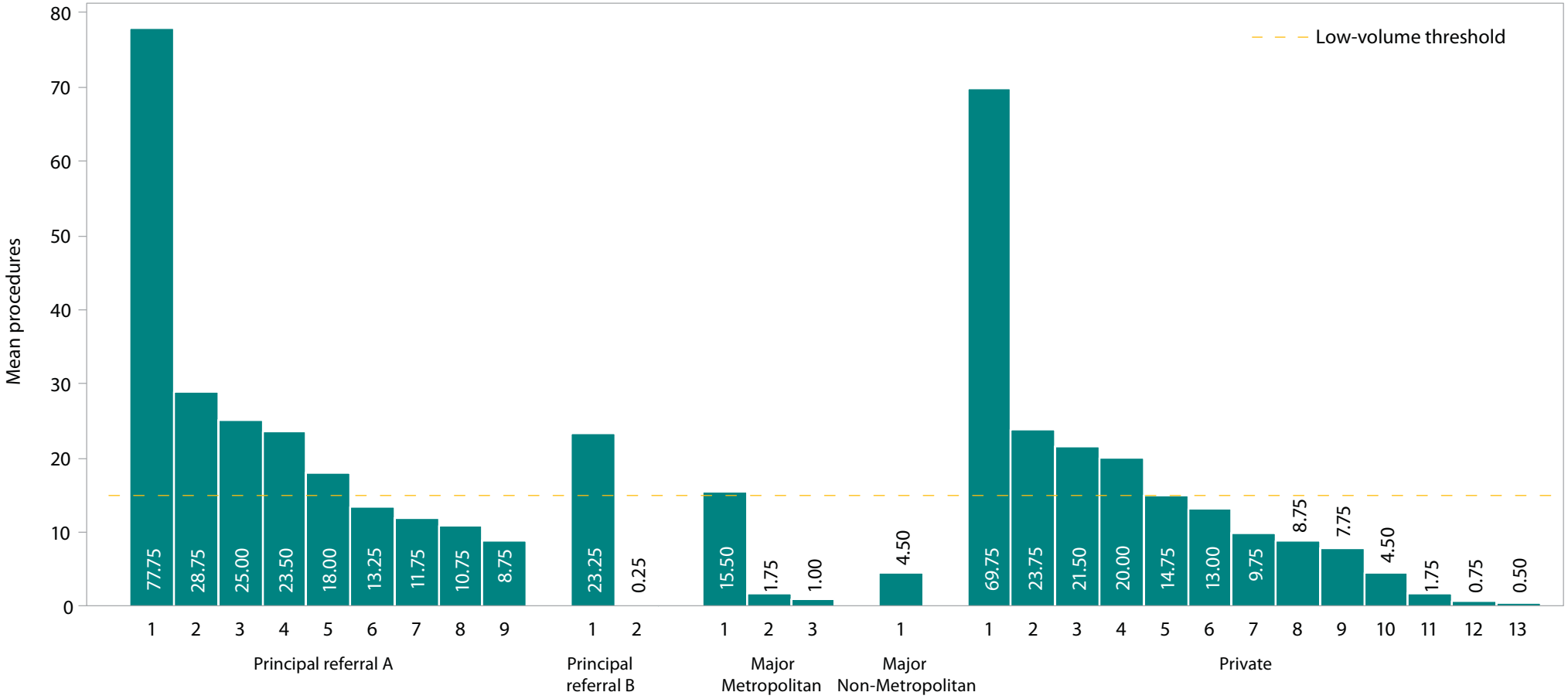
Despite a less consistent relationship between volume and outcome for lung cancer resections, there may still be a benefit from undertaking these procedures in specialist high-volume centres, particularly given the long-term survival benefit that has been demonstrated in some settings (Bach PB, *et al*., 2001; Birkmeyer JD, *et al*., 2007).

What we don't know: Despite the inconsistent relationship between hospital surgical volume and operative mortality for lung cancer, there is evidence that surgeon volume accounts for a large proportion of the effect of hospital volume. This relationship has not been extensively studied, but approximately one quarter of the effect of hospital volume on 30-day operative mortality for lung resection can be attributed to individual surgeon case volume (Birkmeyer *et al*., 2003). In the NSW setting, the relative importance of experience of the operating surgeon is unknown.

Lung cancer surgery

Chart 13-4

Annual mean procedure volume for lung cancer surgery at NSW facilities by hospital peer group, 2005-2008



Source: Cancer Institute NSW.

Notes: Only the first appropriate surgical procedure for each person is included; Excludes paediatric specialist, district group 1&2, ungrouped acute, nursing home, community, psychiatric, multi-purpose service, hospice, rehabilitation. 'Low-volume threshold' is the point at which there is a trend for lower mortality.

Why is this important? Surgical resection is the recommended treatment for cancers of the colon and rectum which have no distant metastases or other contra-indication to resection, such as patient co-morbidity, unfavourable histological features or anatomical location (Australian Cancer Network Colorectal Cancer Guidelines Revision Committee, 2005; National Comprehensive Cancer Network, 2011).

Resection for rectal cancers can carry a higher risk of post-operative morbidity and mortality than for colon cancers (Australian Cancer Network Colorectal Cancer Guidelines Revision Committee, 2005). These procedures have therefore been subject to some scrutiny to develop methods of measuring and improving post-operative outcomes. Worldwide, there is some evidence for an inverse relationship between operative mortality and hospital surgical volume for rectal cancers (Hodgson D C, Zhang W, & Zaslavsky AM *et al*, 2003; Kressner M, Bohe M, & Cedermark B*et al*, 2009; van Gijn W, Gooiker GA, & Wouters MW *et al*, 2010). However, a variable relationship has been shown for colon cancers (Birkmeyer JD, Siewers AE, & Finlayson EVA *et al*, 2002; Borowski DW, Bradburn DM, & Mills SJ, 2010; Simunovic M, Rempel E, & Theriault ME *et al*, 2006; Urbach DR & Baxter NN, 2004). The absolute differences in adjusted post-operative 30-day mortality have been estimated at 1-3 per cent for rectal resections (Hodgson D C, *et al*., 2003; Kressner M, *et al*., 2009).

There is some limited evidence for a long-term survival advantage for rectal cancer patients treated in high- versus low-volume centres. (Borowski DW, *et al*., 2010).

Findings:

Colon

An investigation was undertaken of the relationship between surgical volume and outcome in hospitals in NSW. No consistent relationship was found for volume of colon cancer procedures. This is most likely due to the large number of hospitals performing very small numbers of procedures annually, making it difficult to accurately investigate this relationship.

Therefore, for surgery for colon cancer a threshold of up to and including 15 procedures a year was used to designate 'low-volume' hospitals. This is consistent with thresholds used in other studies (Davila JA, Rabeneck L, Berger DH, & El-Serag HB, 2005; Iversen, *et al*., 2007; Nugent & Neary, 2010), although there is considerable variance in the definitions used for high- and low-volume across studies.

Of the 84 hospitals undertaking resections for colon cancer in the period 2005-2008, 52 (61.9 per cent) performed *more than 15 procedures* on average annually. Of the remaining 32 (38.1 per cent) who performed 15 or fewer procedures annually, 16 performed *five or fewer* procedures.

Rectum

The Cancer Institute NSW undertook an investigation of the relationship between surgical volume and outcome in hospitals in NSW. No consistent relationship was found for volume of rectal cancer procedures. This is most likely due to the large number of hospitals performing very small numbers of procedures annually, making it difficult to accurately investigate this relationship.

Therefore, for surgery for rectal cancer, a threshold of up to and including *six procedures a year* was used to designate 'low-volume' hospitals. This is consistent with thresholds used in other studies. (Hodgson D C, *et al*., 2003).

Of the 80 hospitals undertaking resections for rectal cancer in the period 2005-2008, 30 (37.5 per cent) performed *more than six procedures* on average annually. Of the remaining 50 (62.5 per cent) who performed *six or fewer procedures* annually, 17 performed *two or fewer* procedures.

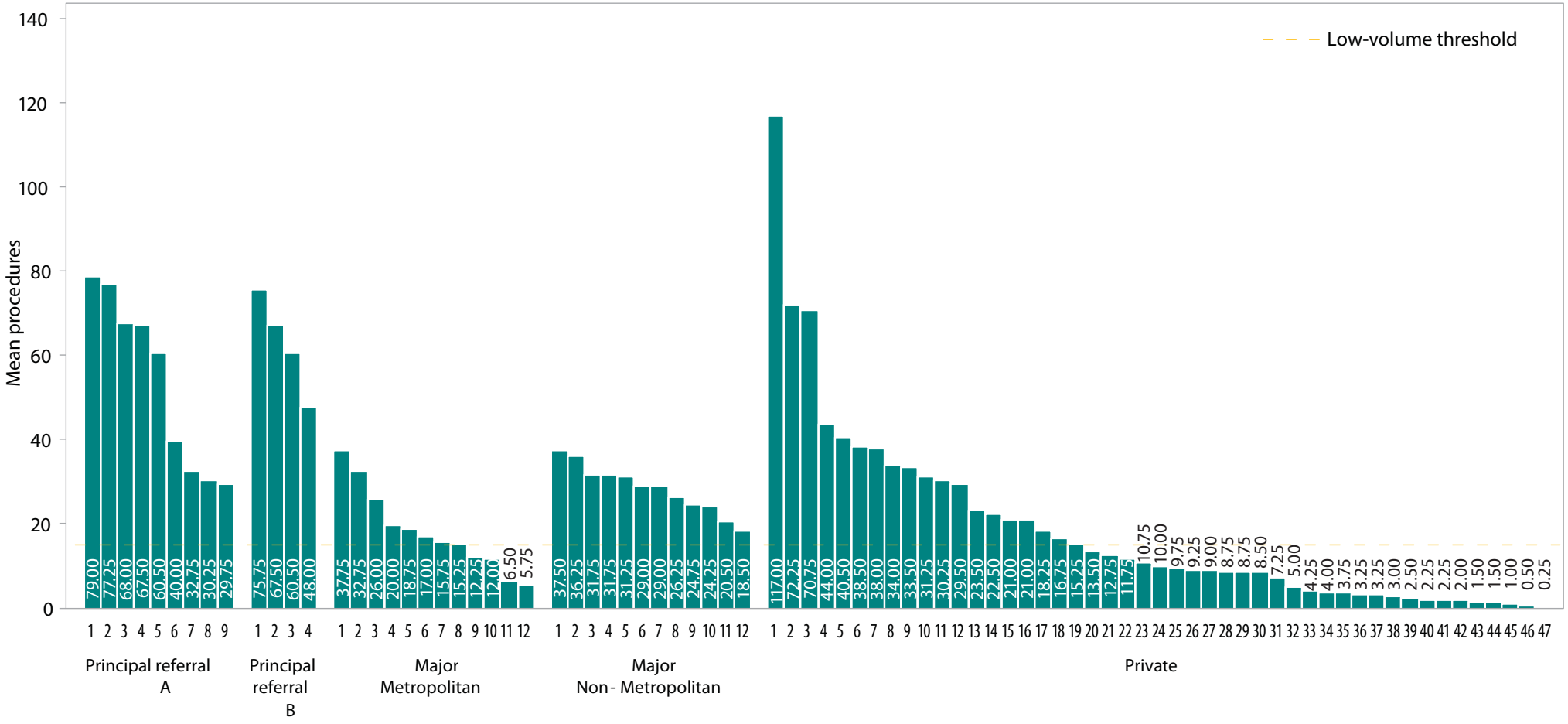
Implications: The inability to demonstrate a clear relationship between surgical volume and outcomes for colon and rectal cancer in the NSW setting may be due to the large number of hospitals undertaking small numbers of procedures annually.

What we don't know: Whilst a clear volume outcome relationship was unable to be demonstrated for colon and rectal cancer surgery in the NSW setting, this may relate, in part, to the surgeon volume performed. Colon resections may be performed for indications other than cancer, thereby increasing the volume of procedures each surgeon performs. This is contrary to resections for cancers such as oesophageal, which are performed almost universally for cancer treatment.

Colon cancer surgery

Chart 13-5

Annual mean procedure volume for colon cancer surgery at NSW facilities by hospital peer group, 2005-2008

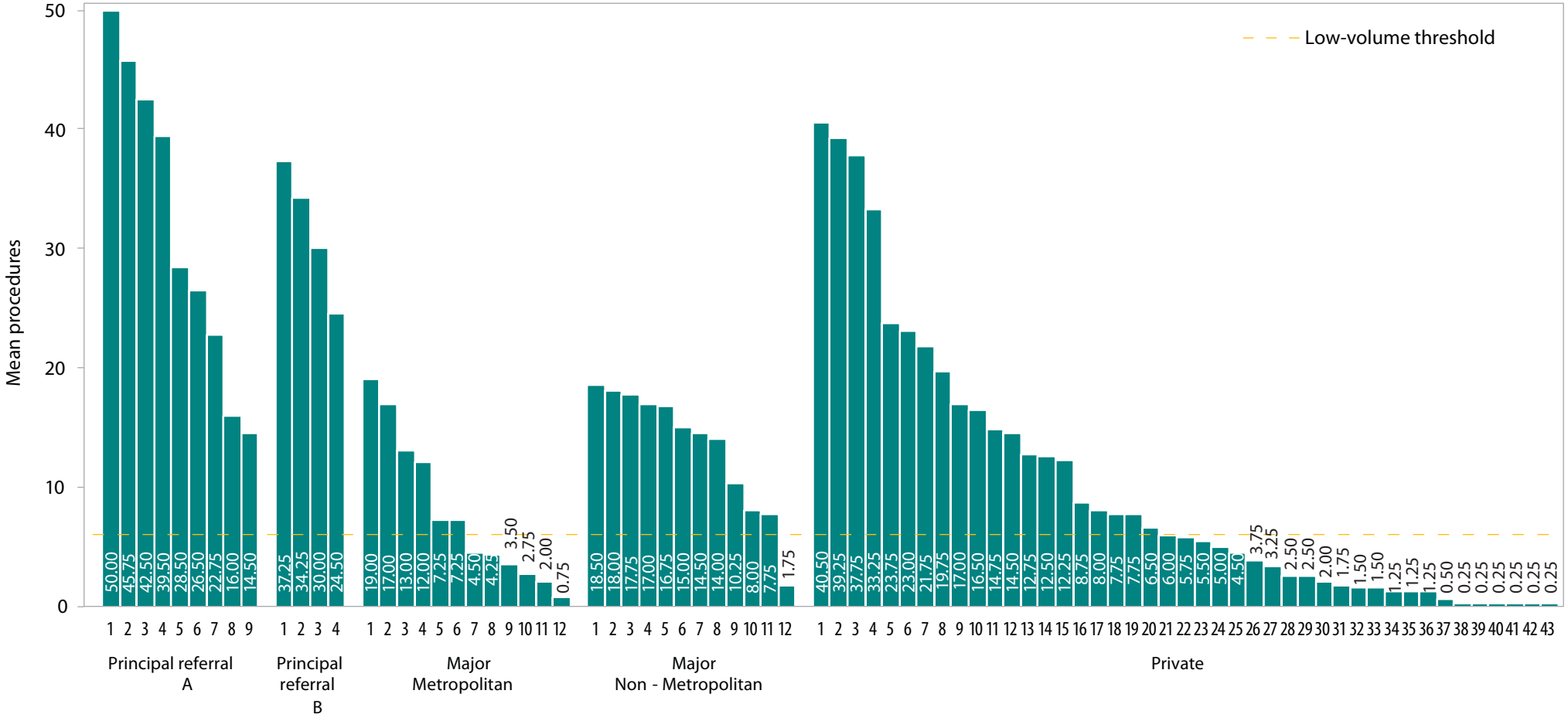


Source: Cancer Institute NSW.
Notes: Only the first appropriate surgical procedure for each person is included; Excludes paediatric specialist, district group 1&2, ungrouped acute, nursing home, community, psychiatric, multi-purpose service, hospice, rehabilitation.
'Low-volume threshold' as determined by literature.

Rectal cancer surgery

Chart 13-6

Annual mean procedure volume for rectal cancer surgery at NSW facilities by hospital peer group, 2005-2008



Source: Cancer Institute NSW.

Notes: Only the first appropriate surgical procedure for each person is included; Excludes paediatric specialist, district group 1&2, ungrouped acute, nursing home,community, psychiatric, multi-purpose service, hospice, rehabilitation. 'Low-volume threshold' as determined by literature..

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MENTAL HEALTH SERVICES | Introduction

Chapter 14

Mental health problems and illnesses affect the perceptions, emotions, behaviour and resulting well-being of individuals. There are numerous types of mental illnesses, with varying degrees of severity. These include anxiety, depression, bipolar disorders and schizophrenia. Mental illness is one of the leading causes of non-fatal burden of disease and injury in Australia. Mental health problems are also associated with higher rates of health risk factors, poorer physical health and higher rates of deaths from many causes, including suicide (CER 2007).

Mental illness was estimated to account for 13 per cent of the disease burden in Australia in 2003, almost three-quarters of which related to anxiety and depression, alcohol abuse and personality disorders.

In 2009 in NSW, around 11.5 per cent of adults (males 11 and females 12) reported high or very high levels of psychological distress (CER 2010). The *2007-08 National Household Survey* has indicated that only 35 per cent of those who experience mental health problems receive any professional help (ABS 2009a). Alongside clinical care, mental health initiatives in NSW are focused on promotion, prevention and early intervention strategies. Improving mental health services is a priority, as indicated in the *Interagency Action Plan for Better Mental Health* (NSWDOH 2005b). It aims to improve the responsiveness and co-ordination of relevant supports from government services to enhance the mental health outcomes of people at risk of, or affected by, mental illness. *NSW: Future Direction for Mental Health* was released in 2006 as a five-year plan, designed to boost efforts in a range of programs across government, comprising prevention, promotion and early intervention.

There is a broad range of biological, genetic and environmental (psycho-social) factors whose interplay may create vulnerability to various forms of mental illness.

Additional environmental exposures, such as frequent or ongoing social stress and/or isolation during childhood and drug abuse, further increase the triggers for onset of conditions such as psychosis and schizophrenia.

Effective therapies for mental health conditions include antidepressant medication and counselling, such as cognitive behaviour therapy. In Australia, the Australian and New Zealand clinical practice guidelines for the management and treatment of depression were developed by the Royal Australian and New Zealand College of Psychiatrists (RANZCP) and funded under the National Mental Health Strategy (Australia) and the New Zealand Ministry of Health (RANZCP 2004). They are similar to guidelines developed in other countries, e.g., in the UK, the NHS's National Institute for Clinical Excellence (NICE) guidelines for *Management of depression in primary and secondary care*. These guidelines have shown that psychological interventions, such as cognitive behaviour therapy and interpersonal therapy, are clinically and cost-effective (NICE 2004).

To determine whether mental health services' quality and safety is improving, there is a need to measure them to track progress. To this end, the NSW Ministry of Health has been involved in inter-jurisdictional work under the *3rd National Mental Health Plan* which aims to establish a core set of national, sustainable mental health and well-being indicators. Implementation of the *National Action Plan on Mental Health* is being monitored by The Council of Australian Governments using 12 progress indicators (COAG 2008b). These provide a way of monitoring the state of mental health services in NSW and allow national comparisons.

Chartbook 2010 includes four mental health indicators from the current suite of NSW Mental Health Services' monitoring indicators. Of these, three are included in the *National Mental Health Performance Framework* indicator set, agreed nationally by jurisdictions.

Why is this important? This indicator measures self-sufficiency – or the extent to which each local health district is able to provide acute inpatient mental health services for its resident population. Local access to services has been a key principle underpinning mental health reforms nationally over many years and is a proposed performance indicator for use in Australia's public sector mental health services (NMHWG&ISC 2005). The principles on which the former AHSs were created that each should be capable of meeting the majority of the healthcare needs of its resident population and be expected to meet an acceptable level of self-sufficiency in providing a full range of health services, including mental health. Local access minimises dislocation of the patient from family and local support. Admission of residents from other local health districts (LHDs) may occur for different reasons. From a patient perspective, people are mobile and sometimes present to hospitals outside their area. From a system perspective, specialist units exist at a limited number of locations - providing non-acute care, neuropsychiatry or intensive psychiatric care. They may have network or referral arrangements with other LHDs. In general, however, the principle when planning mental health services, such as used in the *NSW Health Mental Health Clinical Care and Prevention Service Planning Model* (MH-CCP), is that the former AHSs should be self-sufficient in the provision of primary and secondary level mental health services. Some level of residual flow for specialised acute services might remain (NSWDOH 2001).

Findings: The data shows stable rates of self-sufficiency for mental health inpatient care across all LHDs over the period 2005 to 2009. The target set by Mental Health and Drug & Alcohol Office (MHDAO) for inpatient self-sufficiency is 95 per cent. In 2009, the overall self-sufficiency for NSW was 86 per cent. Across LHDs, self-sufficiency for acute inpatient mental health care ranged from 95 per cent in Hunter New England to 70 per cent in South Eastern Sydney.

Implications: The self-sufficiency rates for mental health admissions are lower when reported by LHDs, than for the geographically larger, former area health services. In 2008, the self-sufficiency rate averaged 94 per cent across the area health services, which masked variation within the geographically smaller LHDs. At the LHD level, there is a higher level of variation which reflects, to some degree, the historical concentration of acute inpatient facilities in the former Fifth Schedule mental health inpatient facilities. Over the past 10 years there has been increasing development of acute mental health inpatient beds within the general acute hospitals. This has resulted in increasing levels of self-sufficiency within the LHDs which did not have Fifth Schedule mental health facilities. These include South Western Sydney, which has increased its self-sufficiency from 71 to 79 per cent in the five years from 2005 to 2009 and Nepean Blue Mountains which has increased from 71 to 80 per cent over the same period. The more dispersed development of acute inpatient mental health facilities is commendable and is resulting in improved access for consumers and minimal dislocation of patients from family and other support. The relatively low level of self-sufficiency in South Eastern Sydney (70.2 per cent) is expected to be related to the creation of a separate local health district for St Vincent's Hospital, which administers the Caritas Unit in Darlinghurst. Following the establishment of the new LHDs, residents of South Eastern Sydney being admitted to the Caritas Unit are treated as outflows. The former South Eastern Sydney Illawarra Area Health Service (which included St Vincent's Hospital) had one of the highest levels of self-sufficiency for acute inpatient mental health care (93.2 per cent in 2008) (CEC 2010).

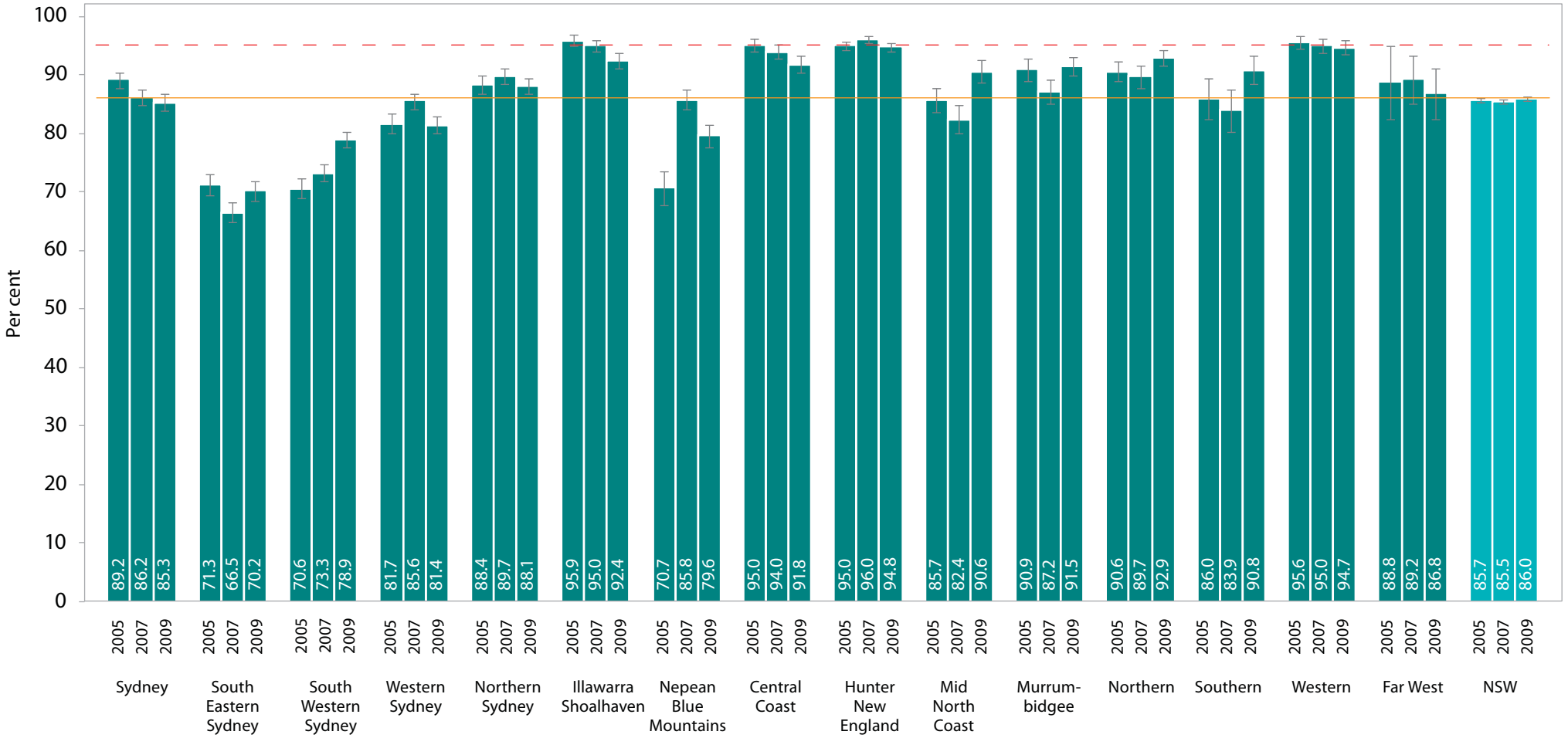
What we don't know: What is the level of self-sufficiency in access to public sector community mental health care for both residential and ambulatory services?

This indicator measures access for those people who are admitted to an acute inpatient bed in a public hospital. What is the level of unmet need in the community for those people with acute mental illness who are not admitted?

Local health district acute inpatient self-sufficiency for Mental Health Services

Chart 14-1

Local health district self-sufficiency in providing acute inpatient mental health care to its own residents, by local health district of usual residence, 2005-2009



Source: InforMH, Mental Health and Drug & Alcohol Office, NSW Ministry of Health.

Why is this important? High levels of unplanned overnight re-admissions, following recent inpatient treatment, are a potential reflection of deficiencies in treatment and/or follow-up care, including by primary care and community-based services (NMHWG&ISC, 2005). Not all re-admissions are inappropriate. Mental health services deal with chronic and fluctuating illnesses and some re-admissions may reflect appropriate responses to new exacerbations, or rehospitalisation after reasonable and assertive attempts at community care.

From a consumer perspective, re-admissions have been linked to a lack of compliance with prescribed medications, alcohol and drug use (Haywood *et al*., 1995), co-morbid personality disorders (Bobo *et al*., 2004) and inadequacy of social supports (Dyck, Hendryx, Short, Voss, & McFarlane, 2002). Other studies suggest that risk of re-admission increases with age and longer initial general hospital stay (CIHI, 2006). The greatest risk period is in the month following discharge (COAG, 2008b).

The provisional threshold for unplanned re-admissions recommended by the Australian Council on Healthcare Standards (ACHS) and the Royal Australian and New Zealand College of Psychiatrists (RANZCP) is 10 per cent (ACHS, 1998; Pirkis, Burgess, Dunt, & Henry, 1999). This is a current ACHS clinical indicator and a National Mental Health Key Performance Indicator. The basis for this target was not clear, however. It was set for 'same facility re-admissions', rather than 're-admissions anywhere in the State', as NSW now measures. Work towards appropriate national targets is still happening, but the NSW target is currently 13 per cent. This differs from previous Chartbooks. Further, in NSW and elsewhere, it is not always possible to distinguish between planned and unplanned re-admissions. This indicator is based on any re-admission to a mental health unit.

Findings: The data shows the percentage of overnight separations from mental health units that result in overnight re-admission to a mental health facility within 28 days of discharge. In line with national definitions, this indicator covers both acute and non-acute units and captures re-admissions to other hospitals, as well as to the same unit. Data on re-admission to other facilities is able to be provided through the use of the State Unique Patient Identifier (SUPI). Overall in NSW, the rate of re-admissions for the period 2005-2009 was steady, at approximately 16 per cent of separations from mental health units. Across local health districts in 2009, rates ranged from 13 per cent in Northern Sydney to 21 per cent in Southern NSW. This compares with an average rate of 14 per cent in 2006-07 for those States and Territories which had a unique patient identifier or matching data system in operation at that time (COAG, 2008b).

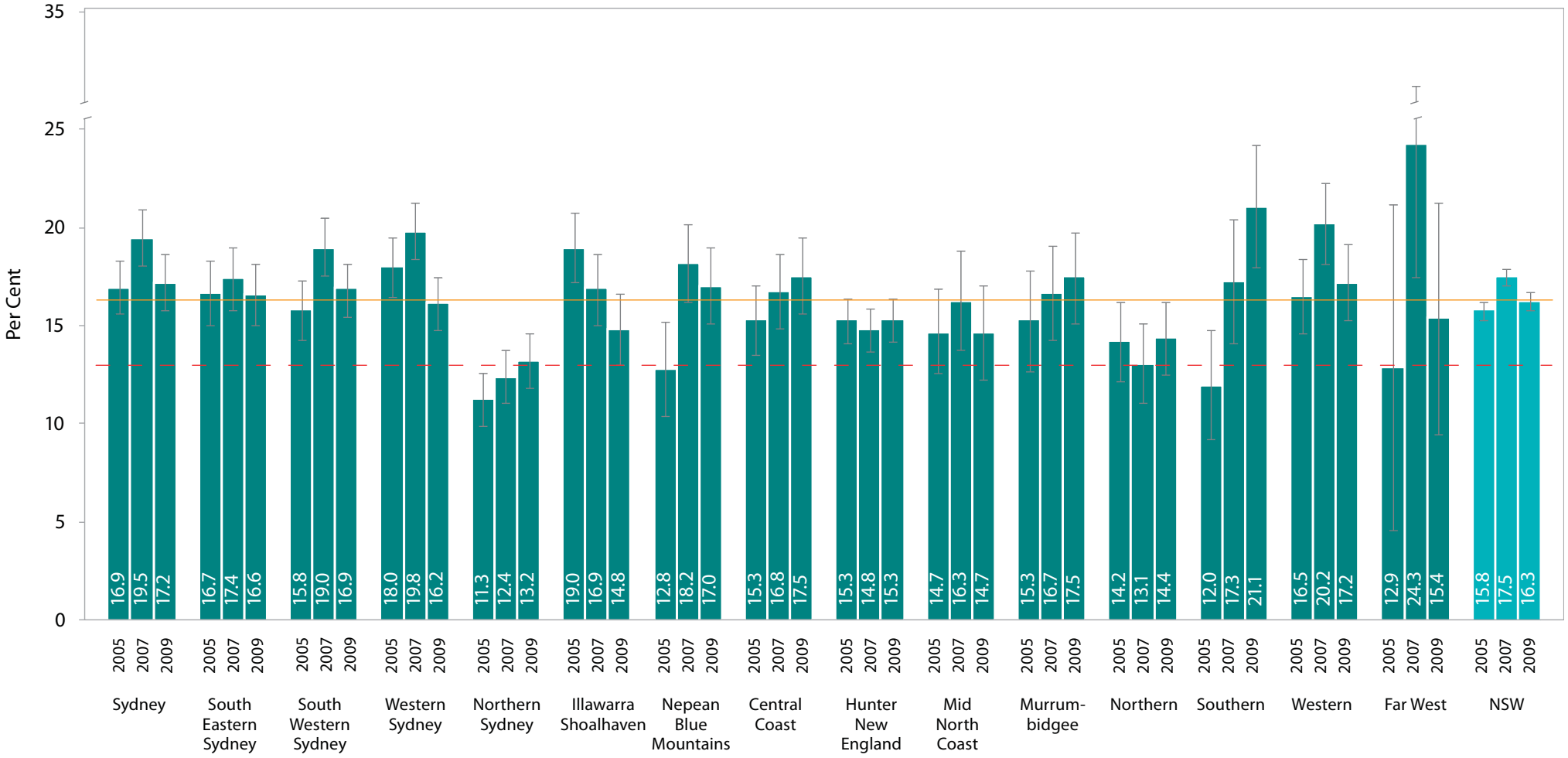
Implications: The aim of psychiatric inpatient services is to provide treatment that enables people to return to the community as soon as possible. Re-admissions to a psychiatric unit, following recent discharge, are a potential indication of incomplete or ineffective treatment. It is also a reflection of the adequacy of follow-up care to support people who return to living in the community, after being admitted to a mental health acute unit. The NSW Government is implementing strategies to enhance the planning, co-ordination and delivery of support to patients when they are discharged from a mental health acute facility (NSWDOH, 2006d).

What we don't know: What is a reasonable rate of re-admission within 28 days, given best practice within mental health services?

Mental health re-admission within 28 days

Chart 14-2

Percentage of overnight separations from a mental health unit who were re-admitted (within 28 days) to a mental health unit anywhere within the State, by local health district of treatment, 2005-2009



Source: InforMH, Mental Health and Drug & Alcohol Office, NSW Ministry of Health.

Why is this important? For mental health patients presenting to emergency departments (EDs) and requiring an admission, expedition of transfer to specialised care provided in a designated mental health bed is important. The NSW health system has a Statewide target that 80 per cent of people being admitted to hospital via the ED spend no longer than eight hours there (NSWDOH 2011b). Delays in admitting mental health patients from the ED to specialist mental health beds have been greater within metropolitan Sydney than rural areas, although some major rural centres, such as Lismore and Wagga Wagga, have also experienced significant service pressures. A major impact in reducing waiting times was achieved between 2005 and 2009, with several initiatives, including the opening of psychiatric emergency care centre (PECC) units adjacent to EDs in ten hospitals (St Vincent's, St George, Wollongong, Liverpool, Nepean, Hornsby, Wyong, Blacktown, HNE Mater and Campbelltown) (NSWDOH 2011a). This indicator refers to the percentage of people admitted to a designated mental health unit in the same facility, after a wait of less than, or equal to, eight hours within the ED (i.e. time from initial triage to departure). The indicator does not include people admitted directly to mental health units, or transferred for admission in other facilities.

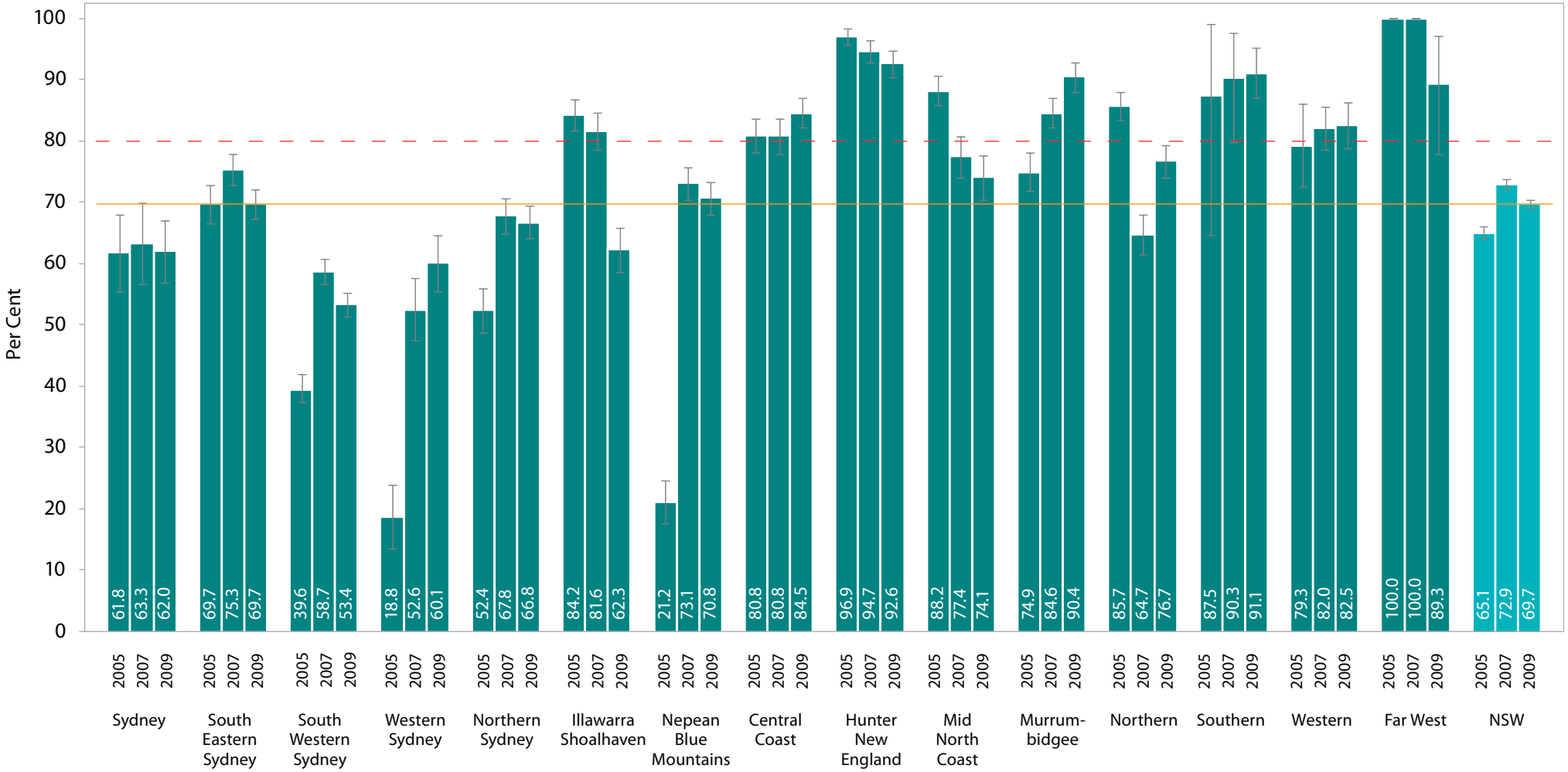
Findings: In 2009, 70 per cent of mental health admissions from emergency departments in NSW occurred within eight hours, a rate below the target of 80 per cent. In 2009, Hunter New England, Southern NSW and Murrumbidgee all achieved higher than 90 per cent. Far West, Western NSW, and the Central Coast were the only other local health districts (LHDs) to meet the 80 per cent target. Performance in achieving this benchmark is higher in non-metropolitan LHDs, the majority of whom achieved the target. None of the metropolitan Sydney LHDs achieved 80 per cent. Performance ranged from 53 in South Western Sydney to 70 per cent in South Eastern Sydney. Performance in the Illawarra Shoalhaven LHD deteriorated significantly in 2009 compared to 2007, with a decrease from 82 to 62 per cent. Overall, performance in meeting the eight-hour admission for mental health consumers has increased from 65 in 2005 to 70 per cent in 2009. This may be due to factors such as the opening of the PECC units, opening of additional acute and non-acute mental health beds, enhanced provision of mental health consultation liaison services in EDs and ongoing clinical redesign processes.

Implications: Mental health presentations within NSW emergency departments are increasing in line with the general upward trend in presentations of around 4.5 per cent per annum over the past four years. This is placing greater demand on specialist mental health capacity, including inpatient beds and workforce. The failure to achieve the 80 per cent target in access performance may be attributable to the increasing volume of mental health presentations and the district's relatively low number of mental health beds, compared with the estimated need. Ongoing improvement in systems and capacity is required to maintain and improve current performance in the timely admission of emergency mental health patients to specialist mental health units.

Emergency admission performance for mental health consumers

Chart 14-3

Percentage of mental health presentations admitted to a designated mental health unit in the same facility after a wait less than or equal to eight hours, by local health district of treatment, 2005-2009



Source: InforMH, Mental Health and Drug & Alcohol Office, NSW Ministry of Health.

Why is this important? Discharge from hospital is a critical transition point in the delivery of mental health care. People leaving hospital after an episode of mental health inpatient treatment have heightened vulnerability and, without adequate follow-up, may relapse or be re-admitted. It is also a period of great stress and uncertainty for families and carers. Follow-up by the community mental health team within seven days is an important intervention to reassure consumers and their carers, as well as promoting recovery, social inclusion and suicide prevention. The rationale underlying this key performance indicator is that:

- A responsive community support system for people who have experienced an acute psychiatric episode requiring hospitalisation, is essential to maintain clinical and functional stability and to minimise the need for hospital re-admission
- Patients leaving hospital after a psychiatric admission with a formal discharge plan, involving linkages with community services and supports, are less likely to need early re-admission
- Research indicates that patients have increased vulnerability immediately following discharge, including higher risk for suicide (AHMAC, 2011).

The inclusion of this indicator, as a measure of progress in the National Action Plan on Mental Health (COAG, 2008b), targets the performance of the overall health system in providing continuity of care.

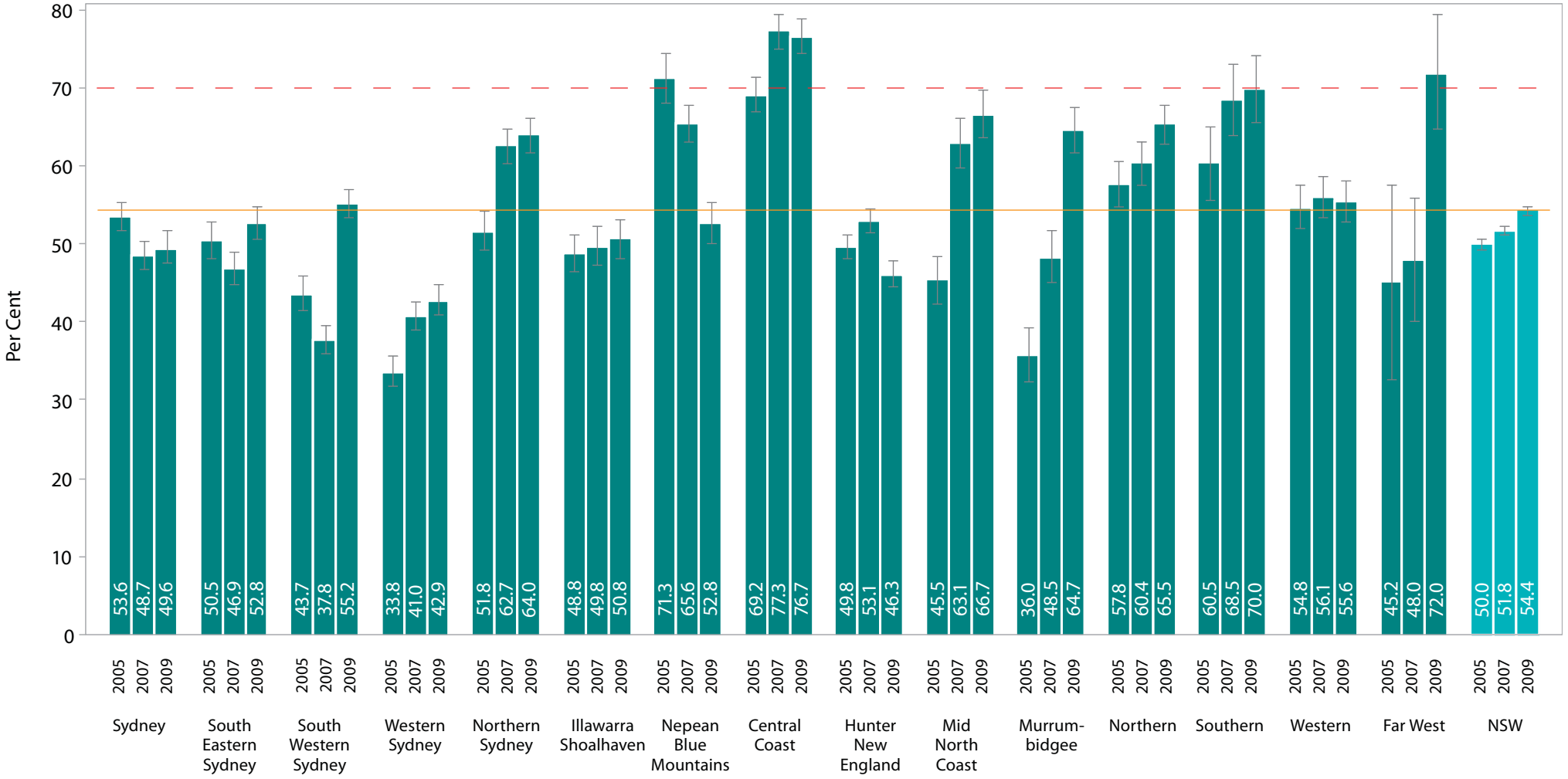
Findings: In 2009, 54 per cent of mental health patients discharged from acute mental health inpatient units in NSW were followed-up within seven days by a community mental health team. This represents an improvement on the 50 per cent of separations in 2005. The proportion of mental health consumers receiving a community mental health team contact within seven days in 2009 varied between 43 per cent in Western Sydney and 77 per cent in Central Coast.

Implications: Overall, the variation in post-discharge follow-up rates between local health districts (LHDs) suggests important differences in practices between their mental health services. Accuracy of information systems in tracking the movement of people between hospital and community care, particularly across organisations, is essential to the utility of this indicator for benchmarking across LHDs and with performance in other jurisdictions. Lower follow-up rates may also be the result of some consumers being managed outside the public system (e.g., by GPs, private psychiatrists). These activities are not captured by existing mental health information systems.

Acute post-discharge community care

Chart 14-4

Percentage of mental health clients who receive a community contact within 7 days of discharge from an acute mental health unit by local health district of treatment, 2005-2009



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AMBULANCE SERVICE NSW | Introduction

Chapter 15

About ambulance: The Ambulance Service of New South Wales is an integral part of the NSW health system and one of the largest ambulance services in the world. It provides clinical care and health-related transport services to 6.89 million people in NSW, distributed across an area of 801,600 square kilometres. In 2009-10 the ambulance service provided over 1,133,000 total responses (both emergency and non-emergency), equivalent to a call for assistance every 28 seconds.

Emergency operations: Responding to triple 000 calls and providing emergency medical assistance is Ambulance Service NSW's primary responsibility. Teams provide pre-hospital care, medical retrieval and health-related transport.

There are also special operational units, including aeromedical and medical retrieval services, doctors, nurses, counter-disaster, specialised operations, rapid response, rescue, snow and special casualty access teams assist in providing emergency responses.

Staff and operations centres: Ambulance Service NSW currently employs over 4,000 staff, operates from 263 different locations across the State, and utilises over 950 ambulances, 350 support vehicles, six fixed-wing aircraft and tasks nine helicopters.

Ambulance Service NSW has four control centres which receive emergency triple 000 and non-emergency telephone requests. Centres are located in Sydney, Newcastle, Wollongong and Dubbo. There is also an aeromedical control centre, located in Sydney, which co-ordinates both urgent and routine fixed-wing and helicopter transfers within NSW.

Operations centre personnel use sophisticated software to prioritise calls based on information from the caller. They then assign the most appropriate ambulance vehicle, utilising GPS tracking technology.

Details of emergency and non-emergency calls are transmitted to a mobile data terminal located within the ambulance vehicle. This provides paramedics with relevant patient information before they reach their destination.

Stations: The 263 ambulance stations throughout the State are located within four separate divisions. Each division is responsible for service delivery, administrative and business support functions.

Challenges: The major challenges facing Ambulance Service NSW are similar to those facing health generally, such as the ageing population and an anticipated increase in chronic illness. The service is working closely with other healthcare providers to use new treatments, technology and paramedic skills to provide the best possible care for patients.

Increasing use of emergency ambulances for non-emergency inter-hospital movements decreases emergency cover, which in turn, increases the time to respond to emergencies.

Additional information, along with maps of the divisions and station sites can be found at http://www.ambulance.nsw.gov.au.

Why is this important? The rapid responsiveness of ambulance services to potentially life-threatening cases is critical in the success of patient outcomes. This chapter examines data for ambulance cardiac, stroke and major trauma responsiveness times. The six stages of high quality pre-hospital care have been described as early detection, early reporting, early response, appropriate on-scene care, care in transit and transfer to definitive care.

Optimal ambulance responsiveness is considered to comprise around ten minutes or less of this period. Ambulance Service NSW collects response time data via the computer aided dispatch (CAD) system, which was introduced in 1999. It also collects data for six key time periods. Regional performance across the State's four ambulance divisions is presented in the attached charts. The categories of responsiveness include:

- Average activation time (ACT) – the time between a call being recorded and a vehicle assigned
- Average turn-out time (TUR) – the time between a call being recorded and the vehicle being en route
- Average travel time (TRV) – the time between a call being recorded and arrival of the vehicle at scene
- Average scene time (SCE) – the time from arrival at scene to depart scene
- Average transport time (TRS) – the time from depart scene to arrival at hospital or destination.

In 2010-11 the four ambulance divisions for NSW were Northern, Southern, Western and Sydney. These did not align with the eight former area health services. Data is presented in the accompanying charts for both "emergency" (coded as 1A, 1B or 1C) immediate response under lights and sirens – incident is life-threatening. In 2005, a new system for directing ambulances to the nearest and most appropriate emergency department, including the use of a hospital clinical services matrix, hospital diversion thresholds and ambulance status boards, was introduced.

Findings: The time interval, from recording a call for ambulance assistance to when an ambulance arrives at the scene, is known as Response Time. This is a composite of ACT, TUR and TRV. In 2010-11, the average ambulance response time in NSW for emergency cardiac cases was 12.3 minutes. Across the four NSW divisions response times ranged from 11.2 minutes in Sydney to 13.3 minutes in Northern and Southern. For trauma cases in 2010-11, average ambulance response time in NSW was 12.5 minutes. Across the four divisions, average times ranged from 10.3 minutes in Sydney to 18.1 minutes in Western. Average response time in 2010-11 for each of the three categories was around 12.4 minutes, compared to around 11.4 minutes in 2008-09. Response times have increased since 2008-09 across all divisions and response time categories.

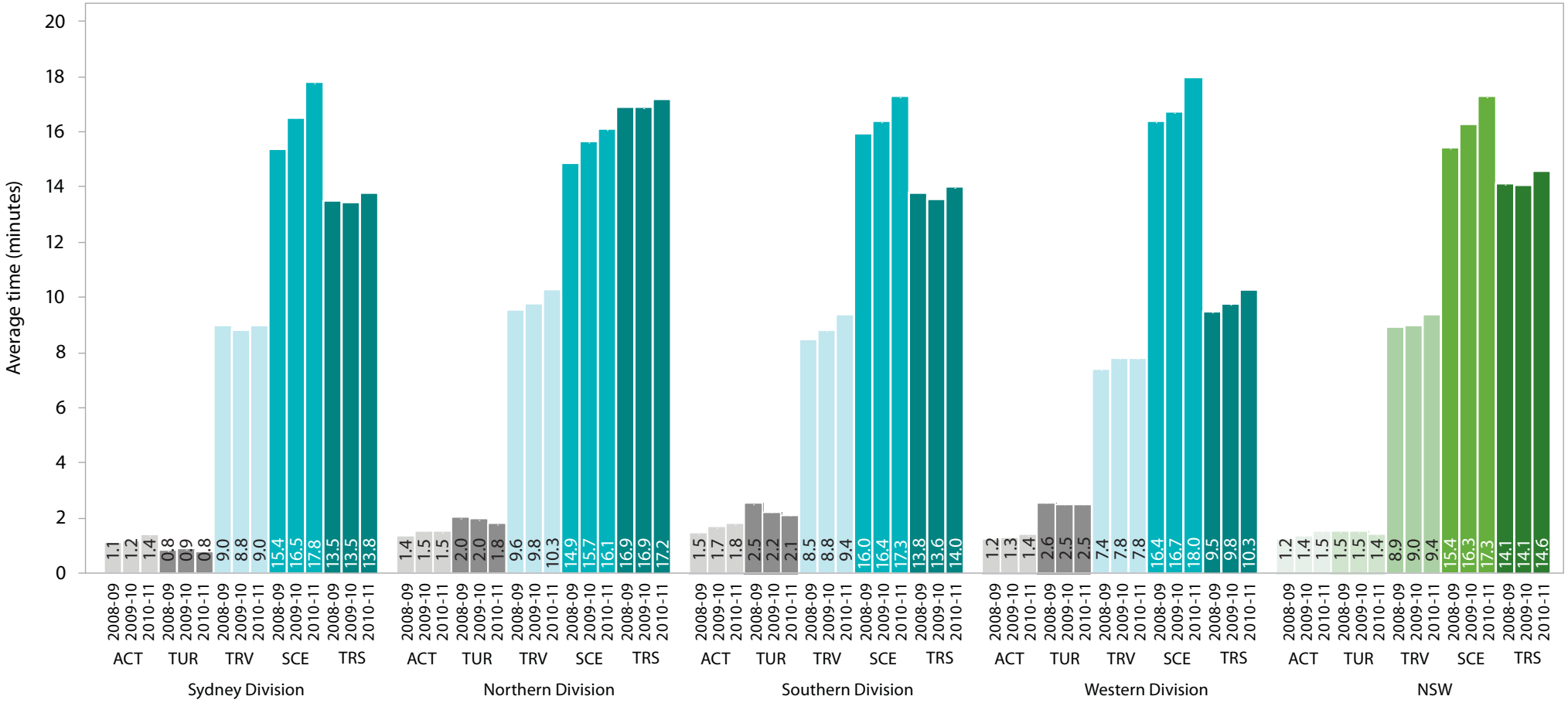
Average time on scene time for 2010-11 was fairly consistent across the four divisions, with NSW results averaging 17.3 minutes for cardiac, 19.3 minutes for stroke and 28.5 minutes for trauma cases. Average transport time for NSW in 2010-11 was 14.6 minutes for cardiac cases, 15.3 minutes for stroke and 22.8 minutes for trauma cases.

Implications: These response times are reflective of the variety of operational environments and demand pressures in which Ambulance Service NSW provides emergency care. The rural operations contend with a large proportion of the workload occurring after normal roster hours, which involves the turn-out of on-call crews. Likewise, a large proportion of emergency workload in remote communities occurs within the town limits.

Ambulance Service NSW: average cardiac emergency responsiveness

Chart 15-1

Average ambulance cardiac emergency case cycle times (in minutes) by emergency or medical categories by NSW ambulance operational divisions, 2008/09 - 2010/11

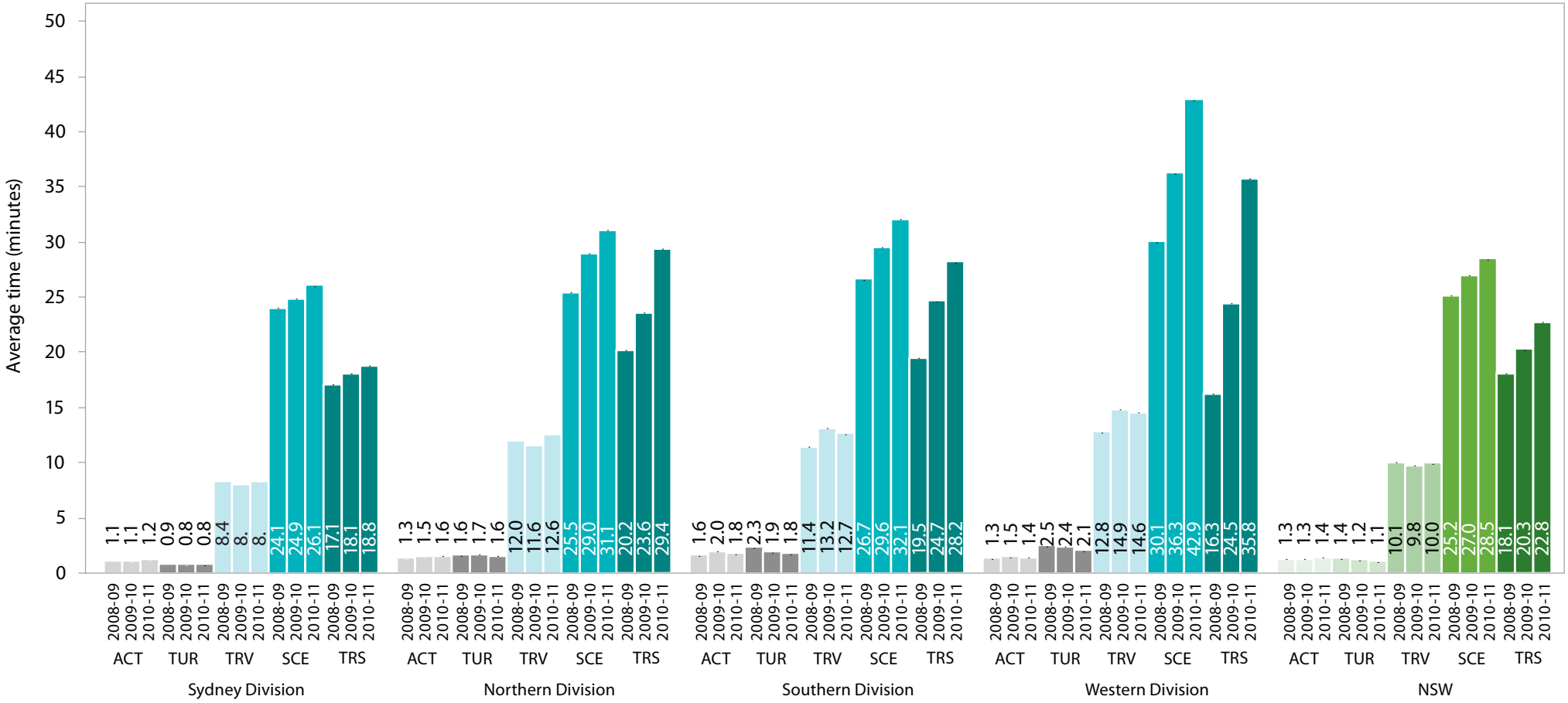


Source: Ambulance Service NSW.
Notes: "Emergency" (coded as 1ABC) immediate response under lights and sirens - incident is life-threatening.
(ACT = activation time; TUR = turn-out; TRV = travel time; SCE = scene time; and TRS = transport time. These are further defined overleaf).

Ambulance Service NSW: average trauma emergency responsiveness

Chart 15-2

Average ambulance trauma emergency case cycle times (in minutes) by emergency or medical categories by NSW ambulance operational divisions, 2008/09 - 2010/11

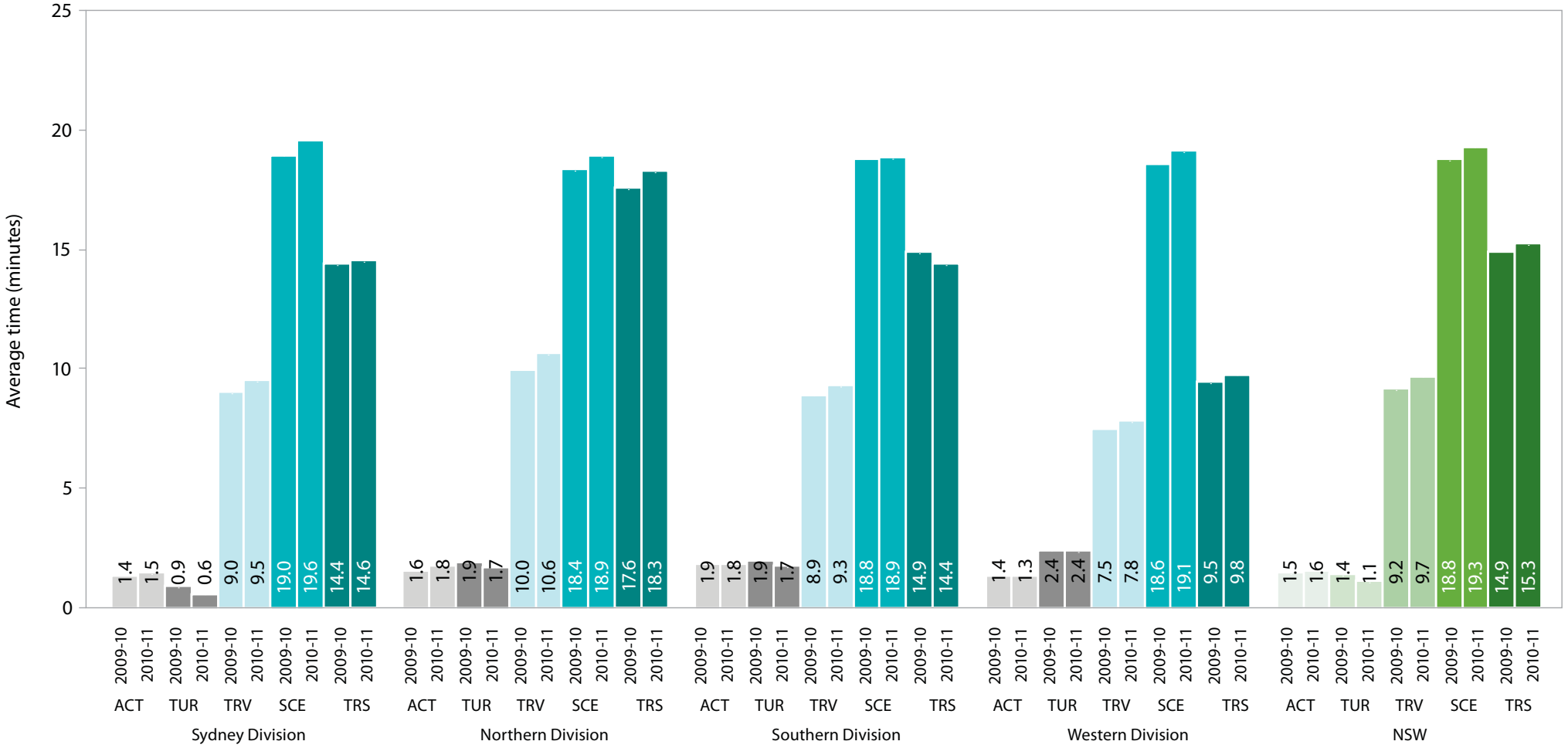


Source: Ambulance Service NSW.
Notes: "Emergency" (coded as 1ABC) immediate response under lights and sirens - incident is life-threatening.
(ACT = activation time; TUR = turn-out; TRV = travel time; SCE = scene time; and TRS = transport time. These are further defined overleaf).

Ambulance Service NSW: average stroke emergency responsiveness

Chart 15-3

Average ambulance stroke emergency case cycle times (in minutes) by emergency or medical categories by NSW ambulance operational divisions, 2008/09 - 2010/11



Source: Ambulance Service NSW.
Notes: "Emergency" (coded as 1ABC) immediate response under lights and sirens - incident is life-threatening.
(ACT = activation time; TUR = turn-out; TRV = travel time; SCE = scene time; and TRS = transport time. These are further defined overleaf).

AMBULANCE SERVICE NSW | Ambulance response times definitions and performance time intervals

Call Answer: The point of time the first keystroke is undertaken.

Call Recorded: The point of time that sufficient details are recorded (i.e., location of incident and type of incident) and details are sent to dispatch for action.

Call Complete: The point of time all details are recorded and the call is terminated.

Vehicle Assigned: The point of time when an ambulance crew is alerted to respond to an incident.

Vehicle Responding: The point of time when the ambulance crew acknowledges and responds to an incident.

Arrive at Scene: The point of time when an ambulance crew arrives at the location of the incident.

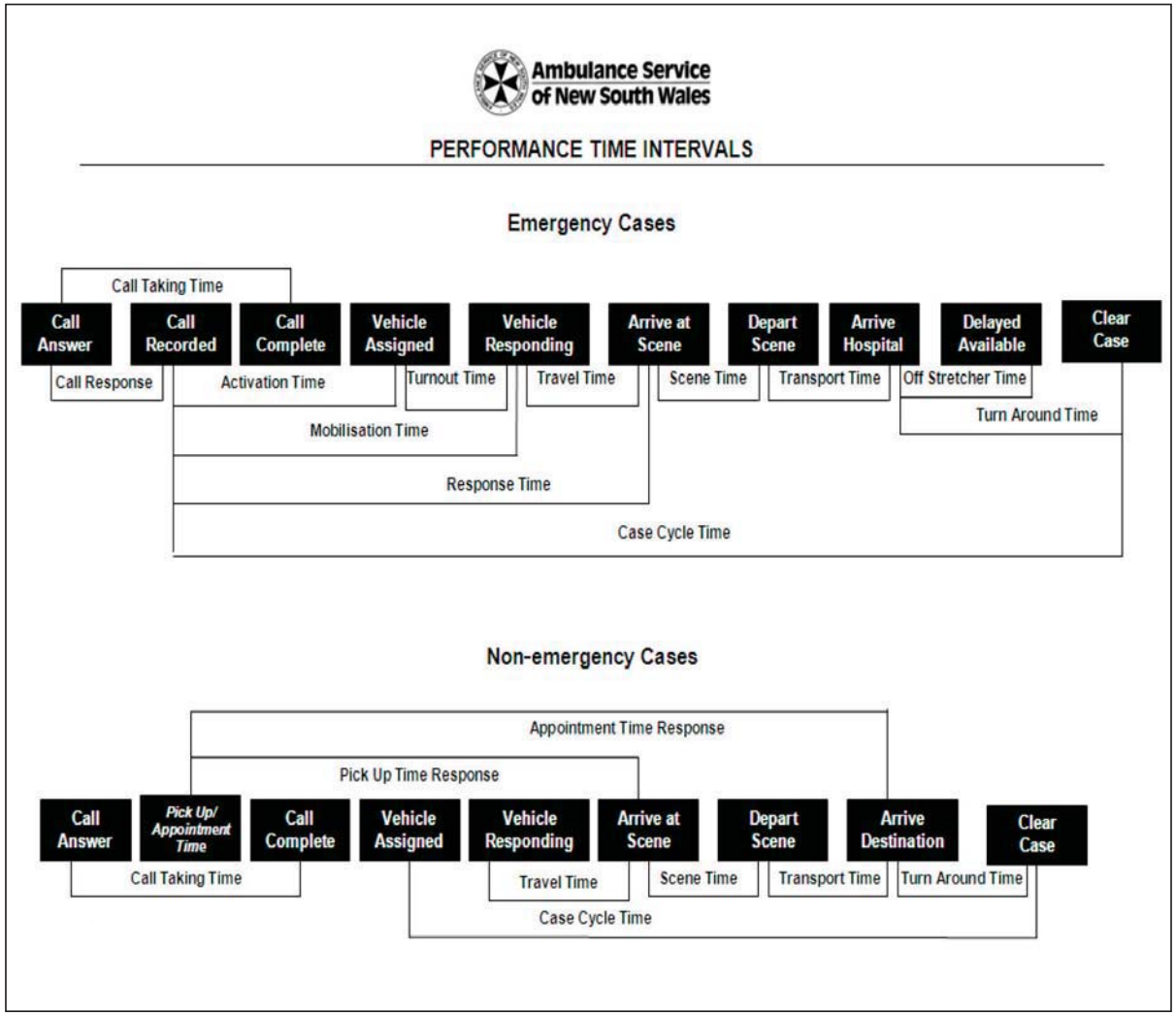
Depart Scene: The point of time when the ambulance crew departs the incident location and undertakes transport.

Arrive Hospital/Destination: The point of time when an ambulance crew arrives at a health facility or other patient destination point.

Off Stretcher Time: The point of time when an ambulance crew transfers a patient onto a hospital bed and hands over the care of the patient to the emergency department.

Incident Complete: The point of time when an ambulance crew completes an incident and is ready to respond to further incidents. (Note: This time point will vary depending upon transport or non-transport circumstances)

Pick Up/Appointment Time: The time of requested or promised pick up of patient and time of patient's appointment.



AMBULANCE SERVICE NSW | Ambulance performance time intervals

Emergency Cases

Call Response . . . . . Time from Call Answer to Call Entered Queue

Call Taking Time. . . . . Time from Call Answer to Call Closed

Activation Time . . . . . Time from Call Recorded to Vehicle Assigned

Turnout Time . . . . . Time from Vehicle Assigned to Vehicle En route

Mobilisation Time . . . . . Time from Call Recorded to Vehicle En route

Travel Time . . . . . Time from Vehicle En route to Arrive at Scene

Response Time. . . . . Time from Call Recorded to Arrive at Scene

Scene Time . . . . . Time from Arrive at Scene to Depart Scene

Transport Time . . . . . Time from Depart Scene to Arrive Hospital/Destination

Off Stretcher Time. . . . . Time from Arrive Hospital to Delayed Available

Turn-around Time . . . . . Time from Arrive Hospital to Case Cleared

Case Cycle Time . . . . . Time from Call Recorded to Clear Case

Non-emergency Cases

Call Taking Time. . . . . Time from Call Answer to Call Closed

Travel Time . . . . . Time from Vehicle En route to Arrive at Scene

Pick Up Time Response . . . . . Time from Pick Up/Appointment Time and Arrive at Scene

Scene Time . . . . . Time from Arrive at Scene to Depart Scene

Transport Time . . . . . Time from Depart Scene to Arrive Destination

Appointment Time Response. . . . . Time from Pick Up/Appointment Time to Arrive Destination

Turn-around Time. . . . . Time from Arrive Destination to Case Cleared

Case Cycle Time . . . . . Time from Vehicle Assigned to Clear Case

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In NSW, the Patient Safety and Clinical Quality Program (PSCQP) was established in 2004, following the Inquiry into Campbelltown and Camden hospitals (Walker, 2004). The cornerstones of the PSCQP are:

- A standardised system for managing, reporting and investigating incidents to ensure that risks are identified and steps taken to prevent recurrence of incidents
- An electronic incident information management system (IIMS) to support centralised reporting and recording of incidents
- Establishment of clinical governance units in each (former) area health service
- Development of a quality systems assessment (QSA) framework
- Establishment of the Clinical Excellence Commission (replacing the Institute for Clinical Excellence) to support and promote systemic improvements.

The measurement and reporting of patient safety and clinical quality indicators is a key component of a quality health system (Wilson *et al*., 1995). Commissioner Garling stated in his recent review of acute care services in NSW public hospitals that

> "Public reporting of information about the health system and hospital performance… is the single most important driver for the creation of public confidence in the health system, engagement of clinicians, improvement and enhancement of clinical practice and cost-efficiency." (Garling, 2008).

This viewpoint is supported by international evidence, which indicates that the disclosure of quality information results in hospitals and clinicians reviewing their own performance in their own environment and making decisions to improve outcomes, in comparison with reliable benchmarks (Marshall & Brook, 2002).

The Chartbook on Safety and Quality in Healthcare in NSW represents a key initiative of the Clinical Excellence Commission in the presentation of clinical indicators in a variety of specific specialty areas. Building on previous Chartbooks, *Chartbook 2010* has further enhanced the chapter on a small set of hospital-wide indicators of safety and quality. The Clinical Excellence Commission has taken a lead role in promoting the collection and reporting of hospital-wide indicators in areas where international evidence has identified the highest vulnerabilities and/or the greatest potential for health gain. These include healthcare acquired infections, management of the deteriorating patient, medication safety, effective use of blood products and the development of a Quality Systems Assessment survey. As with the more specific specialty-level clinical indicators, these hospital-wide measures will highlight issues that require further investigation, to accurately diagnose the nature of the problems and commitment to implement changes to address them.

Data presented in this chapter covers notification of clinical incidents within the Incident Information Management System (IIMS), hand hygiene compliance, participation in the Medication Safety Self-assessment Program, participation in the safety and quality indicators for intensive care units (Australian and New Zealand Intensive Care Society - ANZICS), Quality Systems Assessment survey, and safety practices and effective and efficient use of blood products..

Why is this important? The Incident Information Management System (IIMS) was established in 2005 as a key component of the NSW Patient Safety and Clinical Quality Program. Gathering information on all incidents that might affect patient safety, whether or not harm occurred, enables contributory factors to be analysed and system-wide lessons learned. All NSW Health staff are responsible for notifying all incidents, near-misses and complaints, using IIMS. Each incident notified in IIMS requires an investigation, in accordance with the level of risk it presents. The Severity Assessment Code (SAC) is used to rate incidents by assessing the consequences of the incident and the likelihood of it occurring again. Of the four ratings, SAC1 is the most serious:

- Clinical SAC1 incidents must be reported to the Ministry of Health within 24 hours and are investigated using root cause analysis (RCA). This category includes the unexpected death of patients, suspected suicide of mental health patients and procedures involving the wrong patient or body part.
- SAC2 incidents require investigation at the local health district level.
- SAC3 and SAC4 require local action, including assigning management responsibility.

Local health districts are responsible for ensuring monitoring and risk rating of all incidents. The Clinical Excellence Commission is responsible for reviewing trends in incidents and providing information on clinical risks. This information also informs Statewide projects aimed at improving the safety and quality of clinical care. The NSW Ministry of Health oversees SAC1 incidents, develops Statewide policies and strategies and disseminates lessons learned from incident management. There are now around 15,500 notifications per month, of which 10,500 are clinical incidents.

Findings: The overwhelming majority of IIMS notifications (95 per cent) are in categories SAC3 and SAC4, where there has been minimal or no harm to the patient, but where staff have identified risk. In 2010, SAC1 incidents comprised half of one per cent of clinical incident notifications. SAC2 incidents comprised 1.7 per cent of total clinical incident notifications on a Statewide basis. The proportional split of incident notifications by SAC category was fairly consistent across local health districts. The number of IIMS notifications has increased each six-monthly period since the system was established in July 2005. The increase in notifications has consistently been among events classified as SAC3 and SAC4. The increase in notifications indicates that staff are increasingly aware of safety issues and are comfortable with notifying them.

There is substantial variation in IIMS reporting rates. High-reliability organisations (those with the best safety records) recognise the importance of no-blame incident reporting systems as a method of learning about the types of errors which may occur. This enables systems to be put in place to reduce the risk of these errors recurring (Reason, 2000). In health, a high rate of reporting is a positive situation and may suggest that staff are more vigilant in identifying anything that may constitute a risk to patient safety. The relative rate allows us to monitor variation in the proportion of the component SAC ratings.

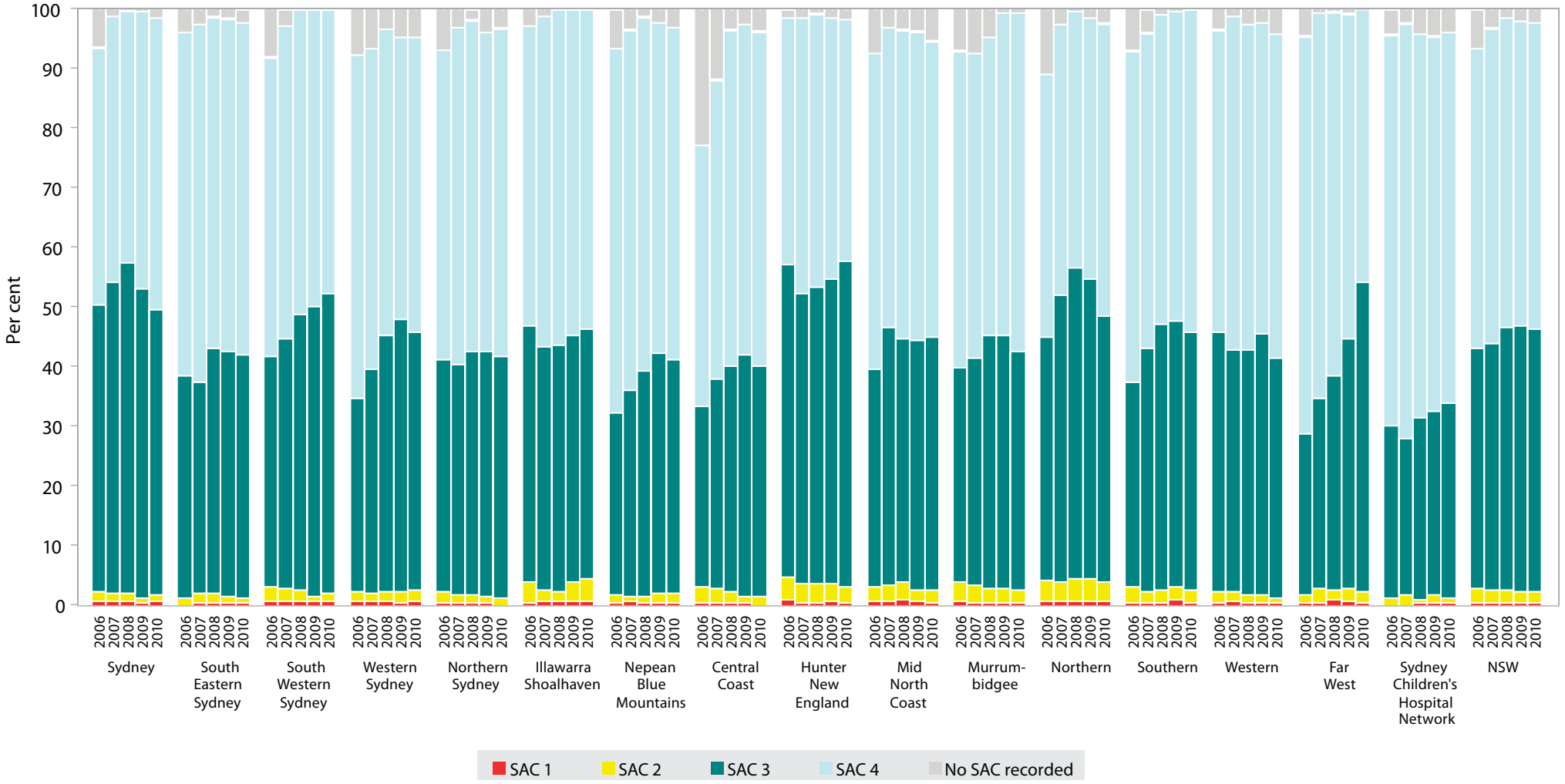
Implications: Analysis of clinical incident data trends and contributing factors provides the opportunity to improve the management in the environment where they occurred. Where appropriate, lessons learned are used to develop and inform projects at a Statewide level. This process cultivates system-wide learning and drives quality improvement at both local and strategic levels.

What we don't know: It is inappropriate to attribute any direct relationship between the numbers of incidents reported and the safety and quality of clinical care. It is the content of notifications, not the count, which informs the system about where improvements need to occur. Fostering a reporting culture where staff speak up about issues which they may previously not have regarded as incidents is vital for patient safety.

IIMS notifications by SAC classification

Chart 16-1

Percentage distribution of IIMS notifications by SAC classification and local health district of treatment, 2006-2010



Source: Incident Information Management System (IIMS), Clinical Excellence Commission and NSW Ministry of Health.
Notes: NSW figures include Justice Health and Ambulance divisions (not shown in bar chart).

Why is this important? The management of medications is complex and there are many opportunities for errors and other incidents to occur. Medication incidents have been estimated to cost the Australian healthcare system upward of $660 million per year and represent 27 per cent of all clinical incidents occurring in Australian hospitals (Roughead & Semple, 2009; Runciman, Roughead, Semple, & Adams, 2003). In NSW, medication and intravenous fluid-related incidents are the second-most frequently reported incident type (CEC, 2006). Each year, approximately 20,000 incidents involving medications and IV fluids are reported to the NSW Incident Information Management System (CEC, 2011a). Some of these incidents result in patient harm, occasionally this harm is severe.

The Medication Safety Self-assessment (MSSA) is a tool comprised of 247 self-assessment questions related to the systems and processes that are in place to ensure the safe use of medicines. The tool was developed by the Institute for Safe Medication Practices (ISMP) in the United Sates of America and was adapted for use in Australia by the Clinical Excellence Commission (CEC) and the NSW Therapeutic Advisory Group with the permission of ISMP in 2006 and officially launched in 2007. The aims of the MSSA are to heighten awareness of the structures and practices that define a safe medication use system, to provide a structured framework for assessing current medication management practices and to enable hospitals to systematically identify gaps in practice and areas for improvement. The MSSA has been used extensively throughout North America, where it has been a key driver for improving medication management systems and reducing opportunities for patient harm. The tool was supported by an on-line database developed and supported by ISMP-Canada. This chart shows the percentage of facilities, by local health district, by NSW peer groups A1 to D2, that had completed the self-assessment and submitted data to the CEC between the start of the MSSA program and June 30, 2011.

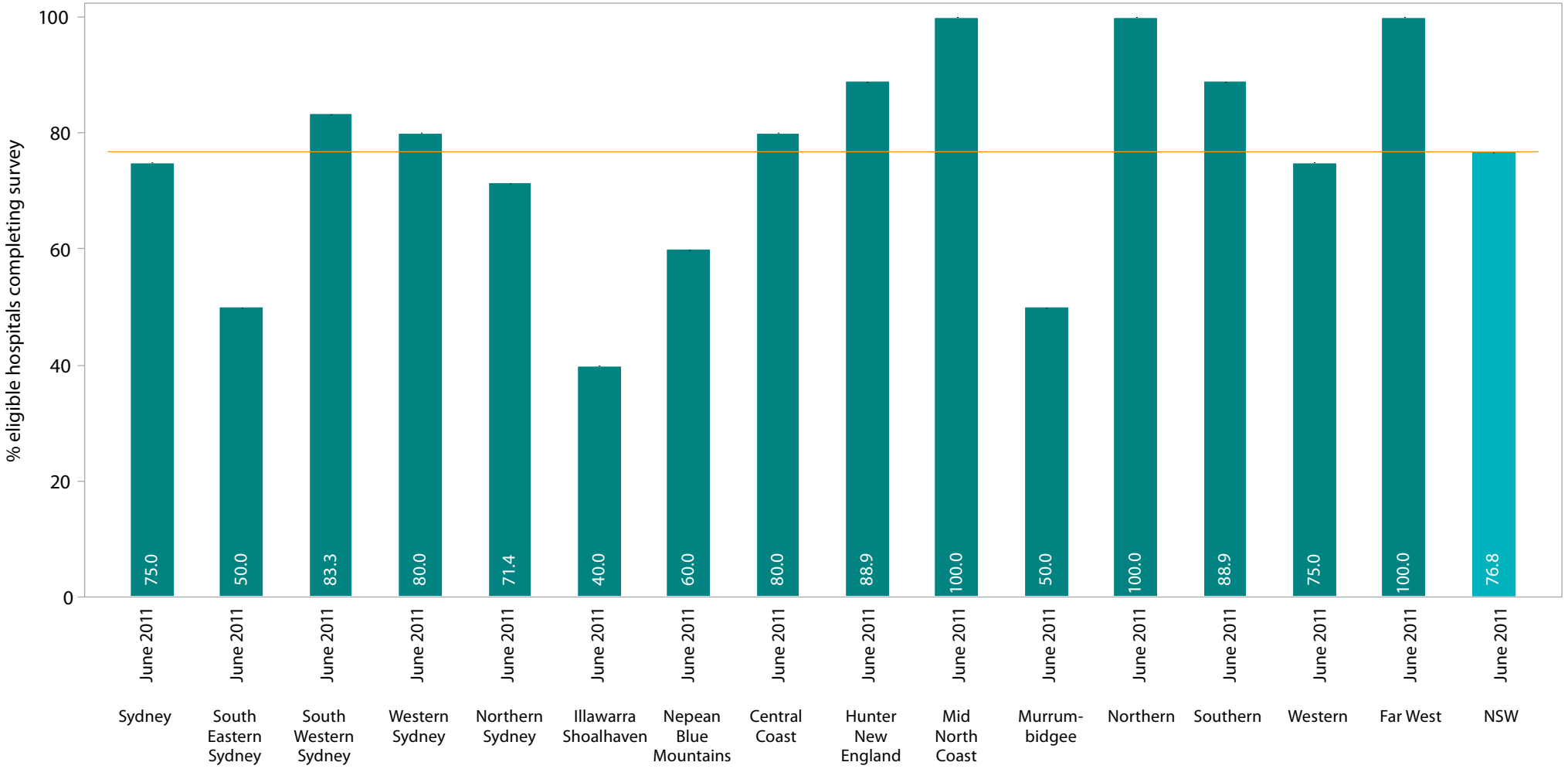
Findings: In this period, 109 (out of 142) NSW public hospitals in peer groups A1 to D2, completed the MSSA and submitted their data to the CEC. Overall participation rate in the MSSA program is very high. Where there are gaps in uptake of the tool, this is largely in smaller sites where completion of the tool may be more difficult, owing to a number of factors including, but not limited to, the lack of pharmacists to participate in and lead the self-assessment, differences in the ways medicines are managed, workforce shortages leading to the inability to form the multi-disciplinary team required to complete the tool. This is likely to have affected the results for Murrumbidgee and Western NSW local health districts where strong efforts have been made to complete the tool. As in 2009, participation by South Eastern Sydney and Illawarra Shoalhaven hospitals remains considerably lower than that of the other areas.

Implications: The majority of NSW public hospitals have now assessed their medication management systems for potential risks to patient safety. In doing so, facilities have highlighted opportunities for local improvement and gathered baseline data, against which they can measure their performance over time. The high participation rate shows a firm commitment to improve medication management systems and in doing so, reduce the risk of patient harm.

What we don't know: What measures could be taken to improve hospitals participation in the MSSA program in those local health districts with participation rates below 75 per cent?

Participation in the CEC's Medication Safety Self-assessment (MSSA) program Chart 16-2

Percentage of NSW A1-D2 peer group hospitals participating in the CEC's Medication Safety Self-Assessment Program by local health district, to 30 June 2011



Source: Medication Safety Self-Assessment Program Data Collection: Clinical Excellence Commission.
Notes: Total includes one VIC network hospital, Justice Health and Sydney Children's Hospital Network.

Why is this important? The sickest patients in the hospital are managed in the intensive care unit (ICU). Variations in ICU mortality largely occur due to differences in type of conditions treated (casemix), which might result from different services provided by the hospital and the role of the ICU in the hospital.

This complexity makes direct comparisons of mortality unreliable. In order to account for this, it is necessary to risk adjust based on severity of illness. There are a number of scoring systems used to predict death. The most common score used is the Acute Physiological and Chronic Health Evaluation (APACHE) score. The APACHE III-J Standardised Mortality Ratio (SMR) for an ICU – or group of ICUs – is calculated by comparing the number of observed deaths multiplied by 100 divided by the number of deaths predicted by the APACHE III-J score, and most closely approximates Australian and New Zealand ICU patients (Drennan, Hart, & Hicks, 2008). The SMRs can then be compared.

The Australian and New Zealand Intensive Care Society (ANZICS) is the peak professional and advocacy body for medical practitioners specialising in the treatment and management of critically ill patients in public and private hospitals. ANZICS leads the world in intensive care research, through its clinical trials group and patient databases, including the adult patient database, the paediatric intensive care registry and the Research Centre for Critical Care Resources. The ANZICS database (the source of this data) exists to provide a peer review mechanism for contributing ICUs.

Findings: The ANZICS results for NSW for the five-year period 2006-07 to 2010-11 are presented by hospital peer group, not local health district (in order to compare the performance of like intensive care units) and by financial year.

Chart 16-3 is the APACHE III-J median score. The severity of illness of patients treated in NSW ICUs is essentially the same when compared with pooled Australian data. The APACHE III-J score is higher, but not statistically significant, in NSW metropolitan hospital settings. The wide confidence interval bands across Australia, NSW total and NSW peer groups, means that no significant difference was observed in the severity of illness in any of these different settings. Variation between different hospital groups more likely reflects the differences in casemix between those hospitals' groups of patients (i.e., higher surgery rates in private hospitals).

Chart 16-4 represents the SMR. NSW data follows the trend of the pooled Australian data. In both cases, the drop in mortality over five years has been significant.

Implications: NSW intensive care services perform comparably to the rest of Australia and there have been improvements during the five financial years shown. The APACHE III-J methodology does allow statistical outliers to be identified and therefore action to be taken. This is, however, a rare event and there is a high consistency of care delivered in NSW ICUs.

What we don't know: Is the APACHE-III data collected in a consistent fashion across ICUs?

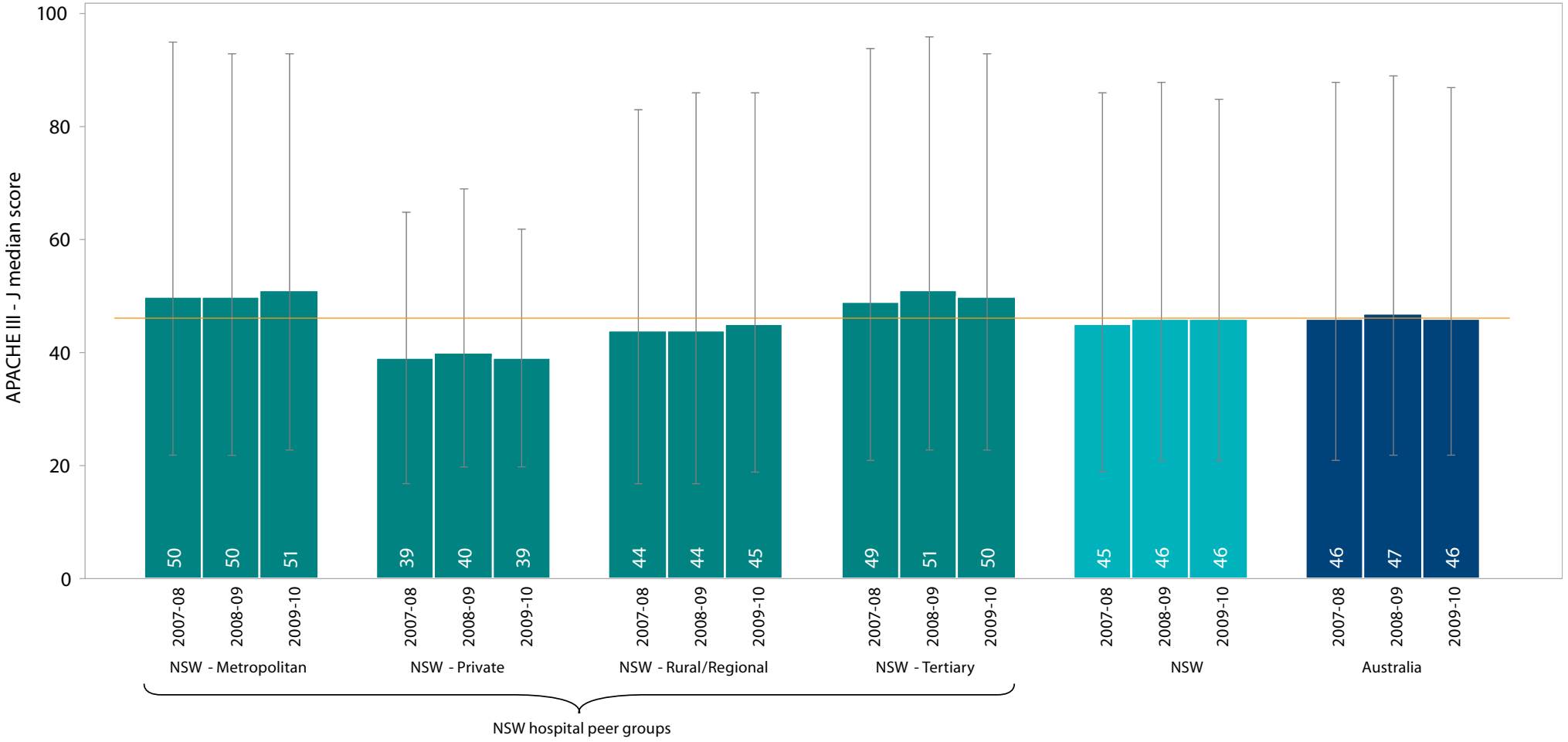
What is the impact of changing casemix complexity over time on the APACHE-III data?

Is there a more effective measure of safety and quality in ICUs?

Intensive care unit performance (ANZICS APACHE III - J median score)

Chart 16-3

APACHE III - J median score intensive care units (ICU) by Australia, NSW and NSW hospital peer groups, 2007-08 - 2009-10

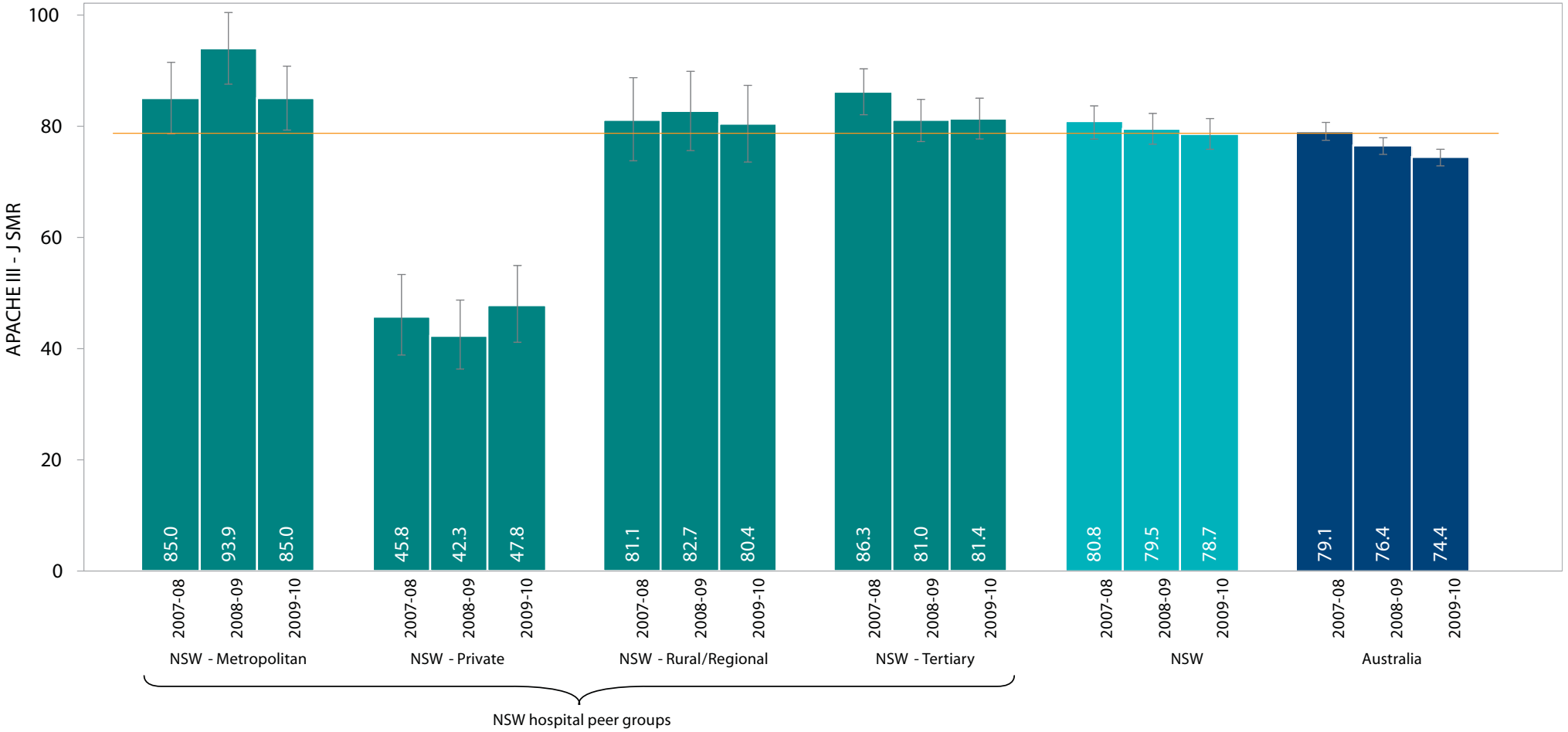


Source: Intensive Care Resources & Activity: Australia and New Zealand, Australia and New Zealand Intensive Care Society (ANZICS).
Notes: Error bars indicate the 10th to 90th percentile of APACHE III scores.

Intensive care unit performance (ANZICS APACHE III - J SMR)

Chart 16-4

APACHE III - J standardised mortality ratio: Intensive care units (ICU) by Australia, NSW and NSW hospital peer group, 2007-08 - 2009-10



Source: Intensive Care Resources & Activity: Australia and New Zealand, Australia and New Zealand Intensive Care Society (ANZICS).
Notes: Error bars indicate the 10th to 90th percentile of APACHE III scores.

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Why is this important? Significant research conducted in NSW hospitals in 2000 indicated that up to 30 per cent of red cell transfusions in stable adult patients were inappropriate (Rubin, Schofield, Dean, & Shakeshaft, 2001). Red blood cell (RBC) transfusion can be life-saving therapy for patients with acute haemorrhage and bone marrow suppression. However, in the elective transfusion setting where patients are haemodynamically stable, there is an emerging body of evidence suggesting that RBC transfusion may be harmful to patients and that the risk/benefit equation swings strongly to the risk rather than benefit side. Further, blood is a precious resource which is freely donated and carries with it stewardship responsibilities. This fact, combined with a shrinking donor pool, has been the impetus for a Statewide approach to improve transfusion medicine practice in NSW.

In 2006, at the request of the NSW Health Department's Fresh Blood Products Advisory Committee, the Clinical Excellence Commission (CEC), in collaboration with NSW Department of Health, undertook an initiative known as the Blood Watch program. Its vision is to have a world-class transfusion medicine practice in NSW specifically in regards to fresh blood products, including red blood cells, and fresh frozen plasma (FFP), cryoprecipitate and platelets. The program has also focussed on the reduction of costs associated with transfusion therapy by reducing the number of inappropriate red cell transfusions, as well as inappropriate usage of platelets and FFP and more effective management of inventory based on improved clinical practice.

The emerging evidence relating to the effects of red cell transfusion on the immune system (Mickler TA, 1992) and its direct link to increased wound infection and increase in length of stay, demonstrates the importance of ensuring appropriate transfusion practice. The impact of the Blood Watch program on improving clinical practice is, in part, due to the information gathered through local audits and data linkage. Data alone, however, is not a catalyst for change. The Blood Watch program has used clinical practice improvement methods to develop a number of innovative approaches to reduce variation in practice and engage all clinicians in the issues of blood management. Since 2007, the CEC has linked data from NSW Health's Health Information Exchange (HIE), local pathology and blood bank databases, which allows comparison of red cell usage and dosage amongst NSW public hospitals.

Findings: Between 2007 and 2009 an overall 10 per cent reduction occurred in usage of red cells within the inpatient cohort and the most recent charts below represent an ongoing decrease (improvement) in the rate of transfusion and dosage.

The overall reduction in utilisation indicates that the Blood Watch program has achieved a reduction in casemix adjusted blood usage and these gains have been maintained.

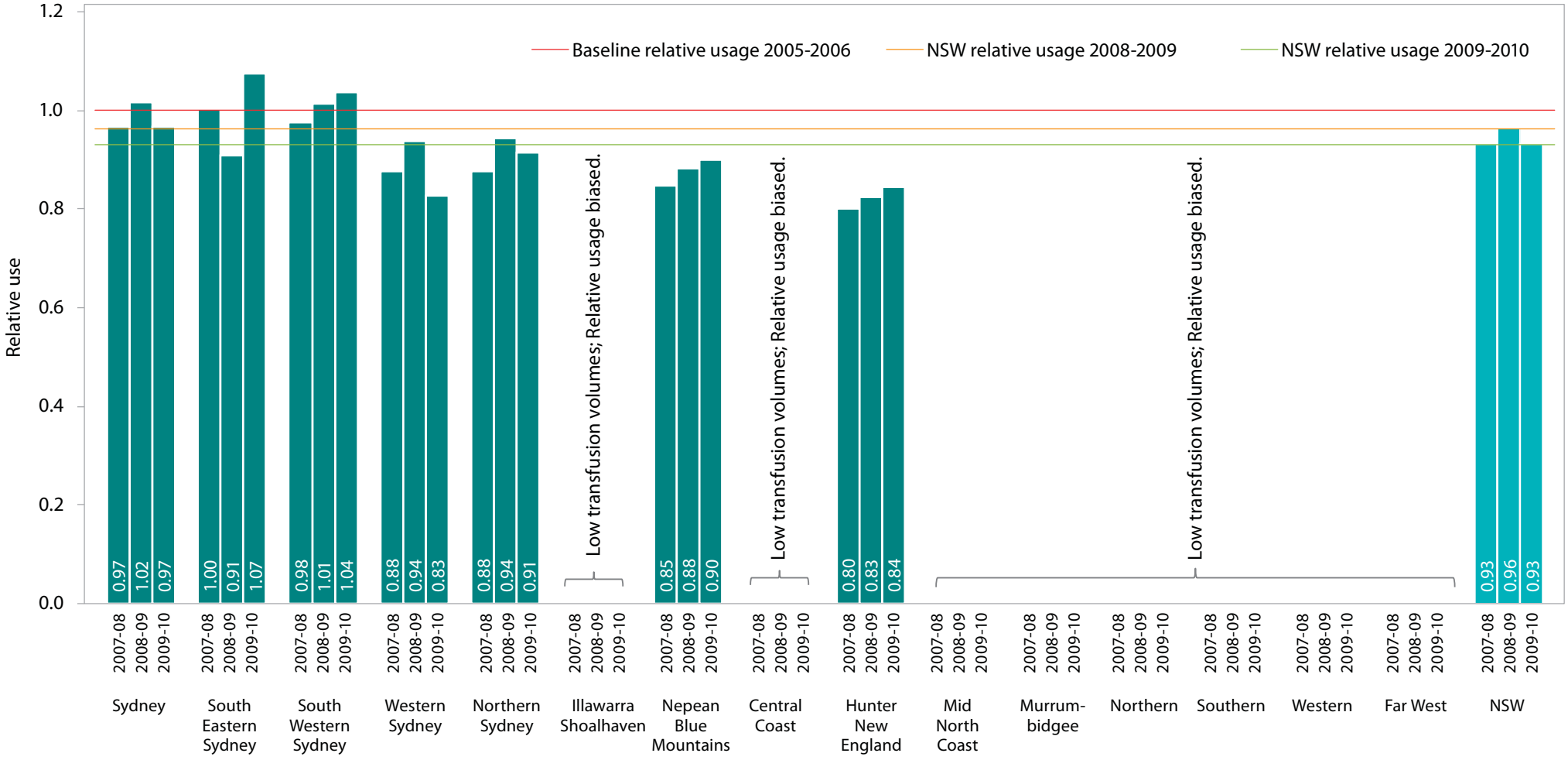
Implications: The charts below by local health district, show the calculated relative use index for both the number of patients and dose of red blood cell transfusions in NSW overnight hospital admissions only. This has been undertaken to reduce any artefact due to administrative counting changes for same-day admissions.

Reductions in red cell usage have two significant implications for NSW: an overall improvement in appropriate transfusion practice, with positive outcomes for patients and, the potential for cost reductions for local health districts' blood budgets.

Blood Watch Program: relative units of blood used

Chart 16-5

Red cell utilisation rate: Relative rate of red cell transfusion occurring in NSW public hospitals by local health district of treatment: Calculated as casemix adjusted relative use index, for overnight separations 2007/08 - 2009/10

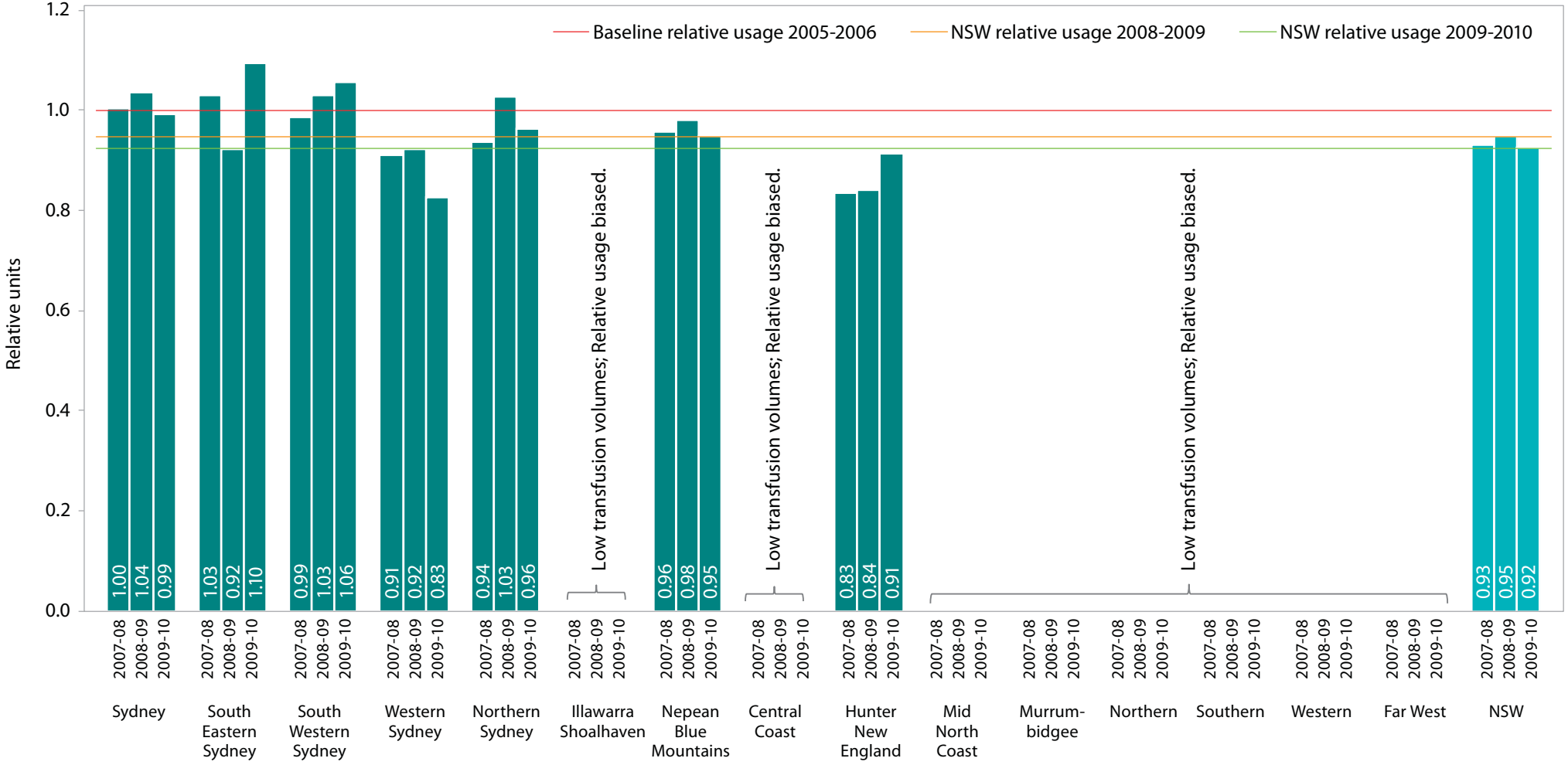


Source: NSW Health Information Exchange (HIE), pathology and blood bank data collected from local service providers.
Notes: Relative use index compares the actual rate of transfusion with the expected rate. If the rates are the same, the LHD will have a score of 1; Numbers above 1 indicate usage above the expected, numbers below 1 indicate usage below the expected. NSW Baseline established from 2005-2006 usage in NSW; Rural/Regional LHDs not shown due to low transfusion numbers.

Blood Watch Program: relative units of blood used

Chart 16-6

Red cell utilisation rate: Relative rate of red cell units (dose) transfused in NSW public hospitals by local health district of treatment: Calculated as casemix adjusted relative use index, for overnight separations, 2007/08 - 2009/10



Source: NSW Health Information Exchange (HIE), pathology and blood bank data collected from local service providers.
Notes: Relative use index compares the actual rate of transfusion with the expected rate. If the rates are the same, the LHD will have a score of 1; Numbers above 1 indicate usage above the expected, numbers below 1 indicate usage below the expected. NSW Baseline established from 2005-2006 data; Rural/Regional LHDs excluded due to low transfusion numbers.

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Why is this important? Hand hygiene is a simple, low-cost action to prevent the spread of many micro-organisms that cause healthcare associated infections (HAIs). Improving the hand hygiene of healthcare staff makes a major contribution to keeping patients safe, because it is one of the most effective ways of preventing and reducing the spread of HAIs.

NSW, through the Clinical Excellence Commission (CEC), is participating in the National Hand Hygiene Initiative (NHHI). This program is based on a WHO World Alliance for Patient Safety Campaign – "Clean Care is Safer Care" and adopts the principles of the 5 Moments for Hand Hygiene. The program, auspiced by the Australian Commission on Safety and Quality in Health Care (ACSQHC), commenced in October 2008 and is funded until June 2012. The purpose of the NHHI is to develop a national approach to improving hand hygiene and monitor its effectiveness. In NSW, the CEC began the collections/publications of hand hygiene (HH) data and led State participation in the National Hand Hygiene Initiative (NHHI). These data demonstrated the continued improvement in Hand Hygiene compliance at both the Statewide and National levels. In December 2010, the Australian Government launched MyHospitals website (http://www.myhospitals.gov.au/) which presents a range of hospital level indicators, including those on hand hygiene.

The program includes:

- Auditing of hand hygiene compliance (based on WHO's 5 Moments for Hand Hygiene)
- Education and training of healthcare workers to conduct the auditing and provide education on the 5 Moments
- Alcohol-based hand rub at the point of patient care.

Audits are conducted by Hand Hygiene Australia credentialed Gold Standard Assessors and/or by ward-based auditors.

Findings: For the 2010 audit periods, data was received from all eight former area health services (AHS) the Children's Hospital Westmead (CHW) and Justice Health. Implementation of the NHHI in NSW is largely complete, although SWAHS is still to complete the implementation process and have submitted small amounts of hand hygiene compliance data only. Data is not yet available by LHD.

Chart 16-7 shows that average hand hygiene compliance in November 2010 was 71.6 per cent. This represents an increase of over ten percentage points compared to the 60.9 compliance twelve months earlier.

Comparison of hand hygiene compliance rates between AHSs requires some caution. Differences in hand hygiene compliance as measured by AHS and by Moment and by healthcare worker between AHSs reflect different stages in implementation of the NHHI in NSW. CHW adopted the NHHI 5 Moments audit tool early in 2009 and NSCC completed implementation during 2010. SWAHS have yet to complete implementation and the small amount of data submitted limits meaningful interpretation. In November, 2010 compliance was significantly different across the eight AHS and CHW and ranged from 62.4 (Northern Sydney Central Coast) to 92.1 per cent (CHW). Hand hygiene compliance for 'Moment 1' (before patient contact), considered by WHO as the most important, differed significantly across the eight AHS and CHW, ranging from 57 (NSCC) to 90 per cent (CHW).

Analysis of hand hygiene compliance by professional group shows that medical and nursing staff compliance was significantly different across eight AHS and CHW. Doctors' compliance ranged from 45.9 (NSCC) to 80.3 per cent (CHW), with NSW average of 55 per cent, while the nursing staff compliance ranged from 69.7 (NSCC) to 92.1 per cent (CHW), with NSW average of 79 per cent.

Implications: It is postulated that hand hygiene compliance is related to a perception of risk to the healthcare worker (Whitby, McLaws *et al*. 2006), hence traditionally, Moments 1 and 2, the "before contact" and "before a procedure" moments have the lowest compliance rates. This is a pattern observed across Australia and other nations using the 5 Moments for Hand Hygiene as an audit process. The results to November 2010 show that the uptake of the NHHI in NSW public hospitals has been very successful. The improvement of around ten per cent in overall hand hygiene compliance achieved in a twelve-month period across AHSs, indicates that the importance of hand hygiene compliance in minimising the risk of transmission of infection to the patient has started to become more established in response to the NHHI.

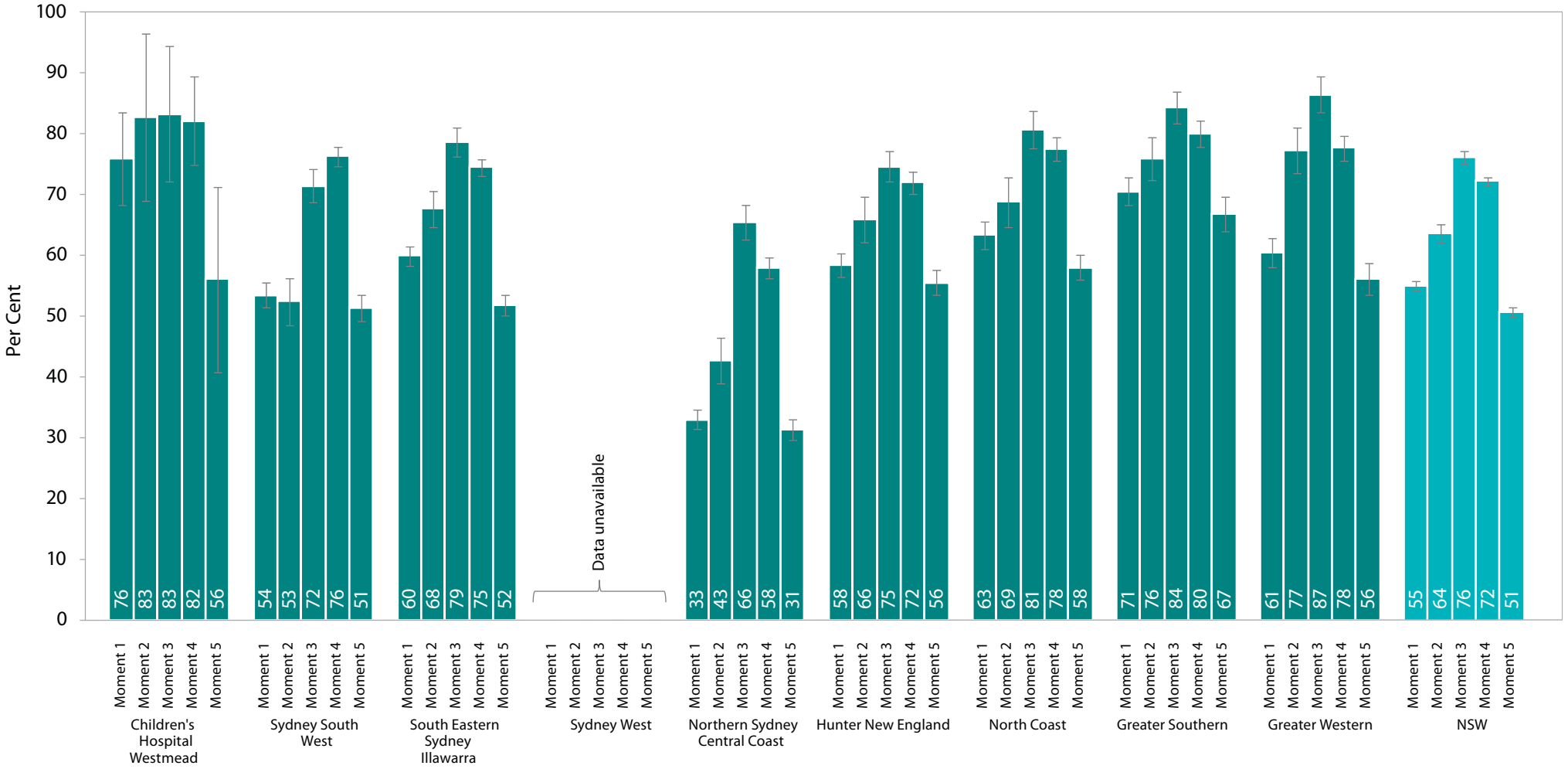
What we don't know: What are effective strategies for improving compliance of medical staff in hand hygiene?

What are effective strategies for sustaining the impact of the NHHI?

Overall staff hand hygiene compliance by Moment

Chart 16-7

Overall hand hygiene compliance according to the *5 Moments* audit tool by all staff and former area health service, April 2010

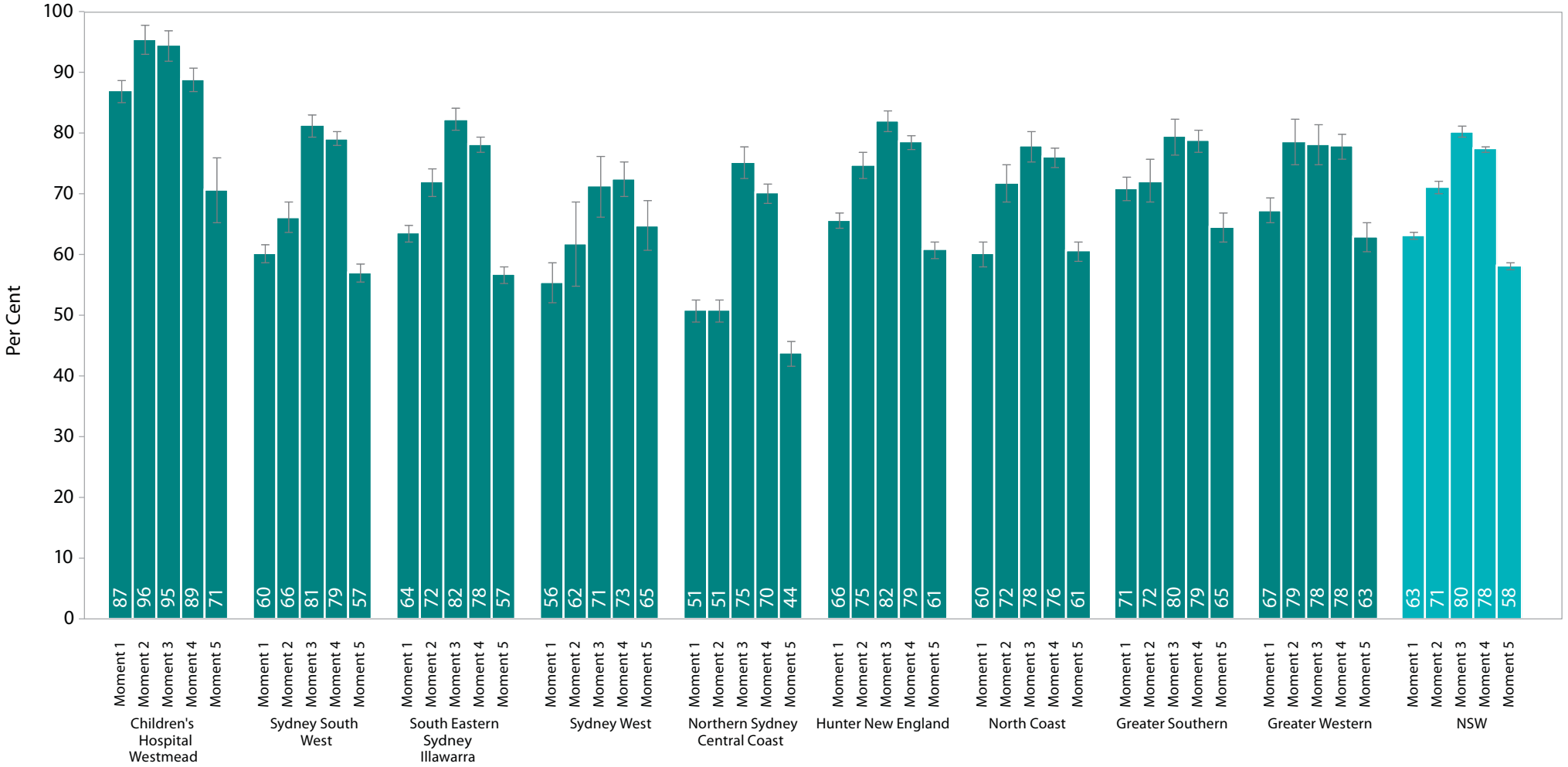


Source: Hand Hygiene Data, Clinical Excellence Commission and NSW Ministry of Health.
Notes: Justice Health included in NSW values; Overall staff includes Allied Health professionals.

Overall staff hand hygiene compliance by Moment

Chart 16-8

Overall hand hygiene compliance according to the *5 Moments* audit tool by all staff and former area health service, August 2010

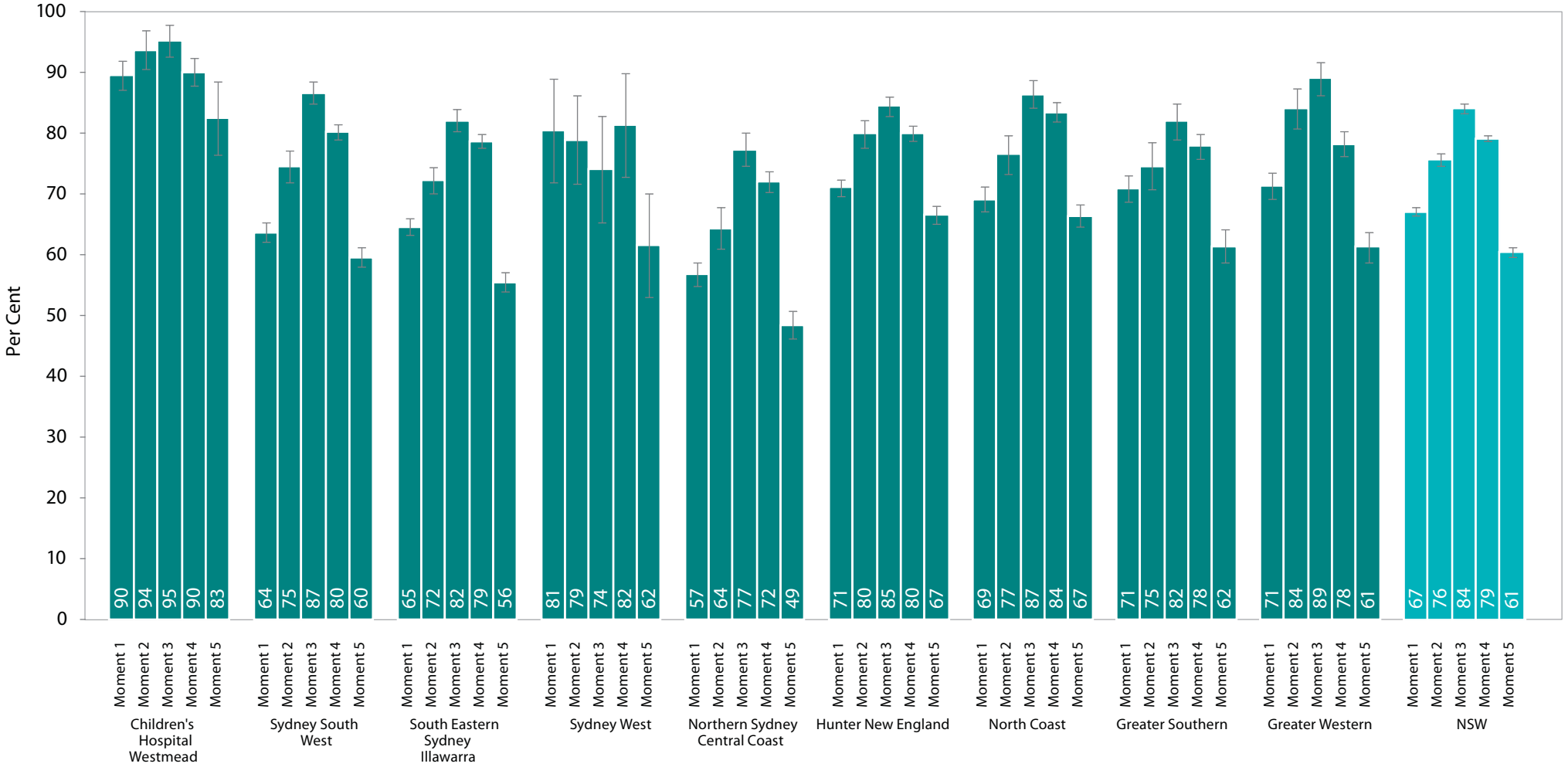


Source: Hand Hygiene Data, Clinical Excellence Commission and NSW Ministry of Health.
Notes: Justice Health included in NSW values; Overall staff includes Allied Health professionals.

Overall staff hand hygiene compliance by Moment

Chart 16-9

Overall hand hygiene compliance according to the *5 Moments* audit tool by all staff and former area health service, November 2010

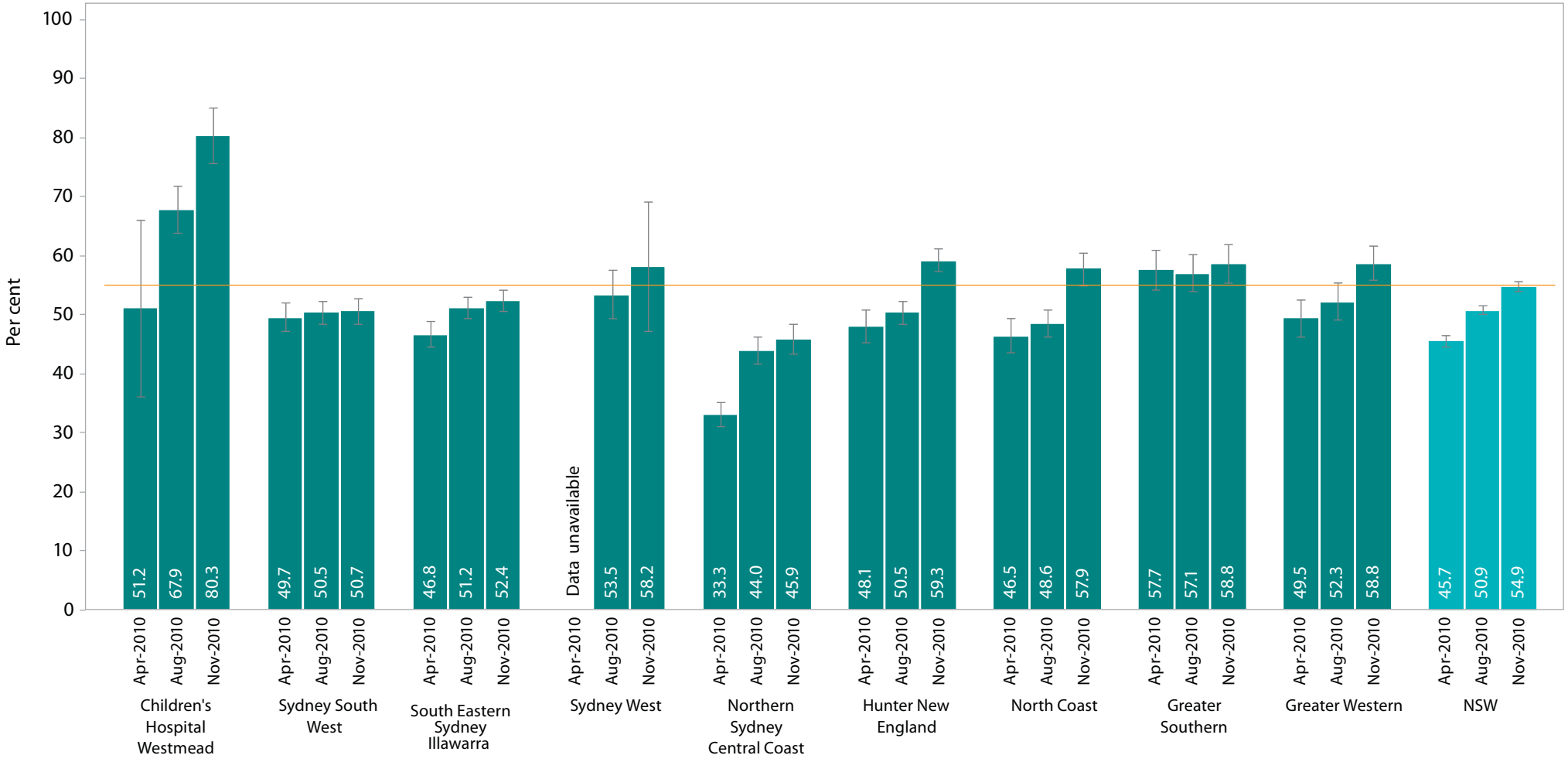


Source: Hand Hygiene Data, Clinical Excellence Commission and NSW Ministry of Health.
Notes: Justice Health included in NSW values; Overall staff includes Allied Health professionals.

Overall medical staff hand hygiene compliance

Chart 16-10

Overall hand hygiene compliance according to the *5 Moments* audit tool by medical staff and former area health service, 2010

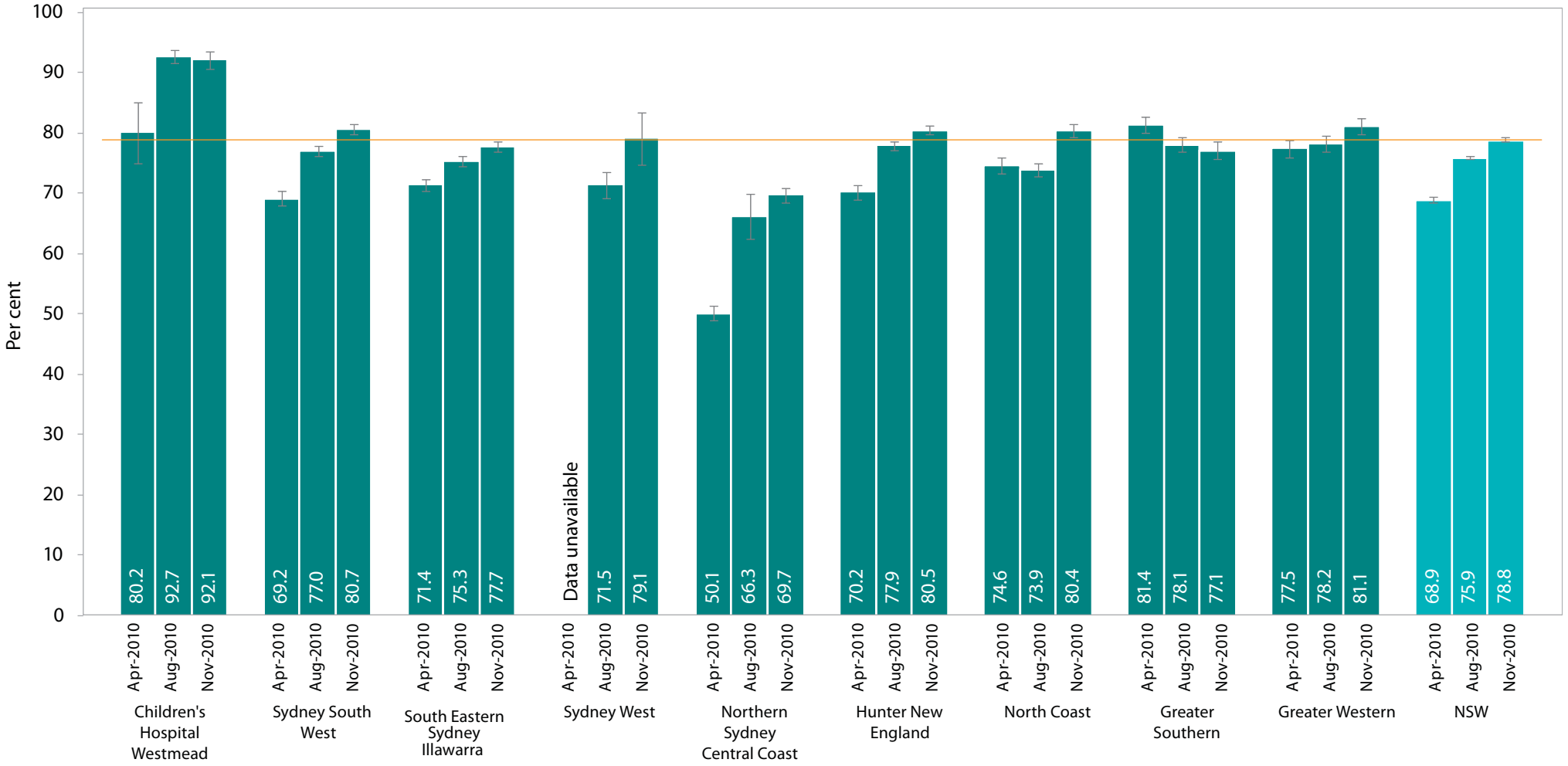


Source: Hand Hygiene Data, Clinical Excellence Commission and NSW Ministry of Health.
Notes: Justice Health included in NSW values.

Overall nurses' hand hygiene compliance

Chart 16-11

Overall hand hygiene compliance according to the *5 Moments* audit tool by nurses and former area health service, 2010

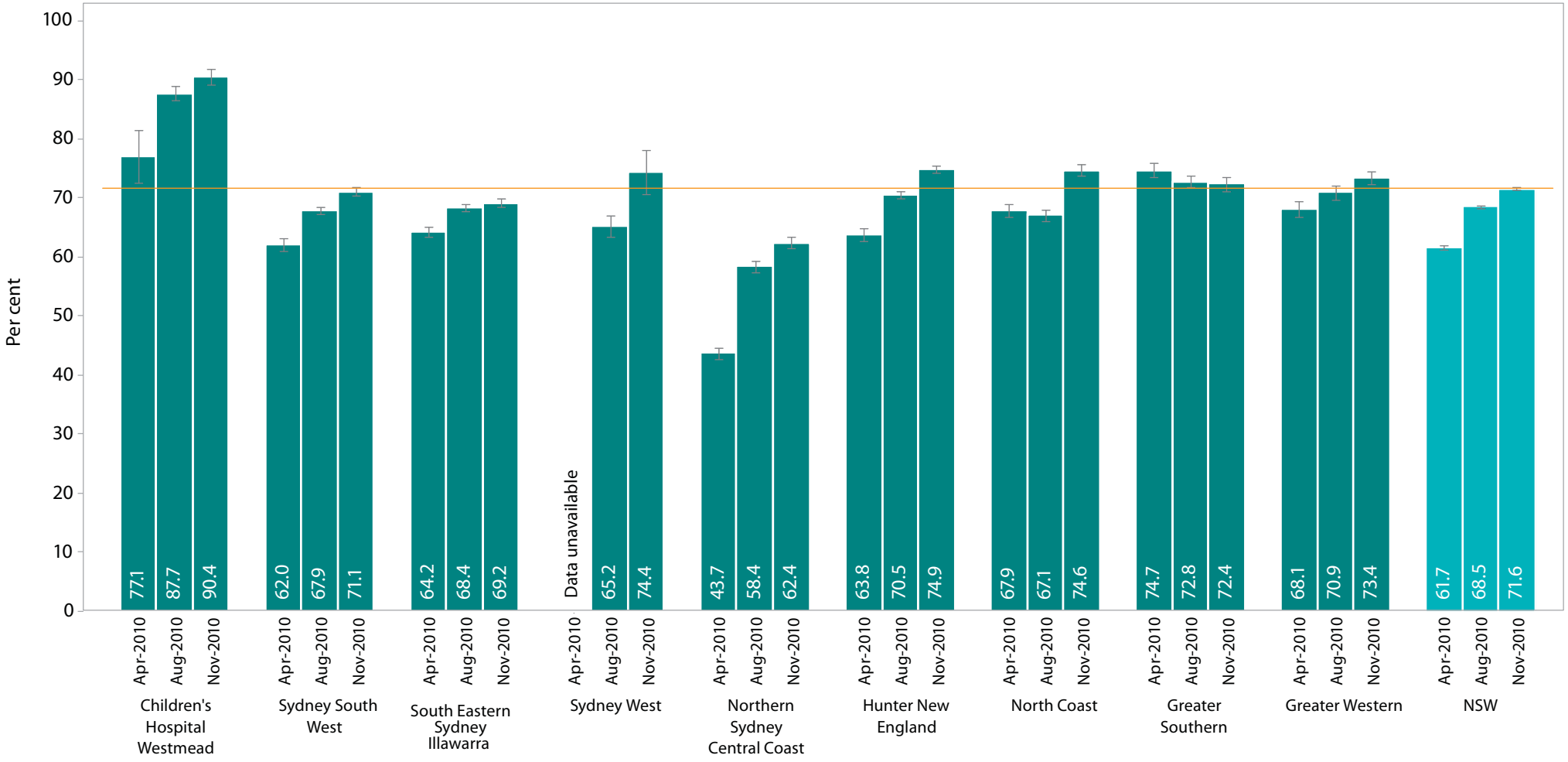


Source: Hand Hygiene Data, Clinical Excellence Commission and NSW Ministry of Health.
Notes: Justice Health included in NSW values.

Overall staff hand hygiene compliance

Chart 16-12

Overall hand hygiene compliance according to the *5 Moments* audit tool by all staff and former area health service, 2010



Source: Hand Hygiene Data, Clinical Excellence Commission and NSW Ministry of Health.
Notes: Justice Health included in NSW values.

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Why is this important? The Quality Systems Assessment (QSA) is a self-assessment of systems for monitoring and managing the delivery of safe and effective healthcare across a number of domains and at different levels of the health system. The QSA aims to improve clinical quality, safety and performance by assisting clinical units, facilities and local health district administrations to identify clinical risks, system weaknesses and policy and program gaps. The QSA is now in its fourth year.

Unlike much of the quantitative data in The Chartbook, the QSA charts reflect data based on the perceptions of managers and clinical staff working in the local health districts (LHDs). The data presented here is an aggregate of self-assessment responses by managers at LHD and facility level and clinicians at clinical unit or department level. At the time of the survey, area health services were in operation in NSW and this data has been translated to the new LHDs for *Chartbook 2010*.

Findings: Charts 16-13 to 16-18 show staff responses regarding perceptions of safety and quality in the workplace and the engagement of doctors and management in the safety and quality agenda in these workplaces. Overall, the data reflects a positive view of culture, with 95 per cent of respondents indicating a positive patient safety and quality culture within their workplace (Chart 16-14). The majority of responses to perceptions of safety and culture in the workplace and of management and doctors' engagement in the safety and culture agenda are positive. However, variations at the local health district level present opportunities to investigate why there may be less positive perceptions of safety and quality and management/doctor engagement in their organisations. In some instances, a less positive response may be an indication of prevailing morale and/or teamwork issues in a facility or unit. The response to the question on availability of alcohol-based hand rub (Chart 16-18) indicates that this important hand hygiene measure is being implemented at most patient care locations throughout the system but there are some areas where lack of availability needs to be investigated.

Implications: Responses to the QSA self-assessment survey provide essential feedback on the "pulse" of the health system, because they reflect how staff think and feel about safety and quality in particular, and about the safety culture operating within their workplace. Healthcare workplaces with a more positive safety culture show lower accident and incident rates (Flin 2009). Staff who perceive their managers to be more committed to safety engage in more safety-related behaviours and fewer risk-taking behaviours. Importantly, senior management commitment is crucial to the development and maintenance of a positive patient safety culture. Senior management commitment can be gauged by the resources (time, money, and people) allocated, and the "status" afforded, to patient safety. The QSA self-assessment responses must always be interpreted in the local context, but these responses do provide an opportunity to highlight areas which may require closer investigation. In summary, the QSA indicates that:

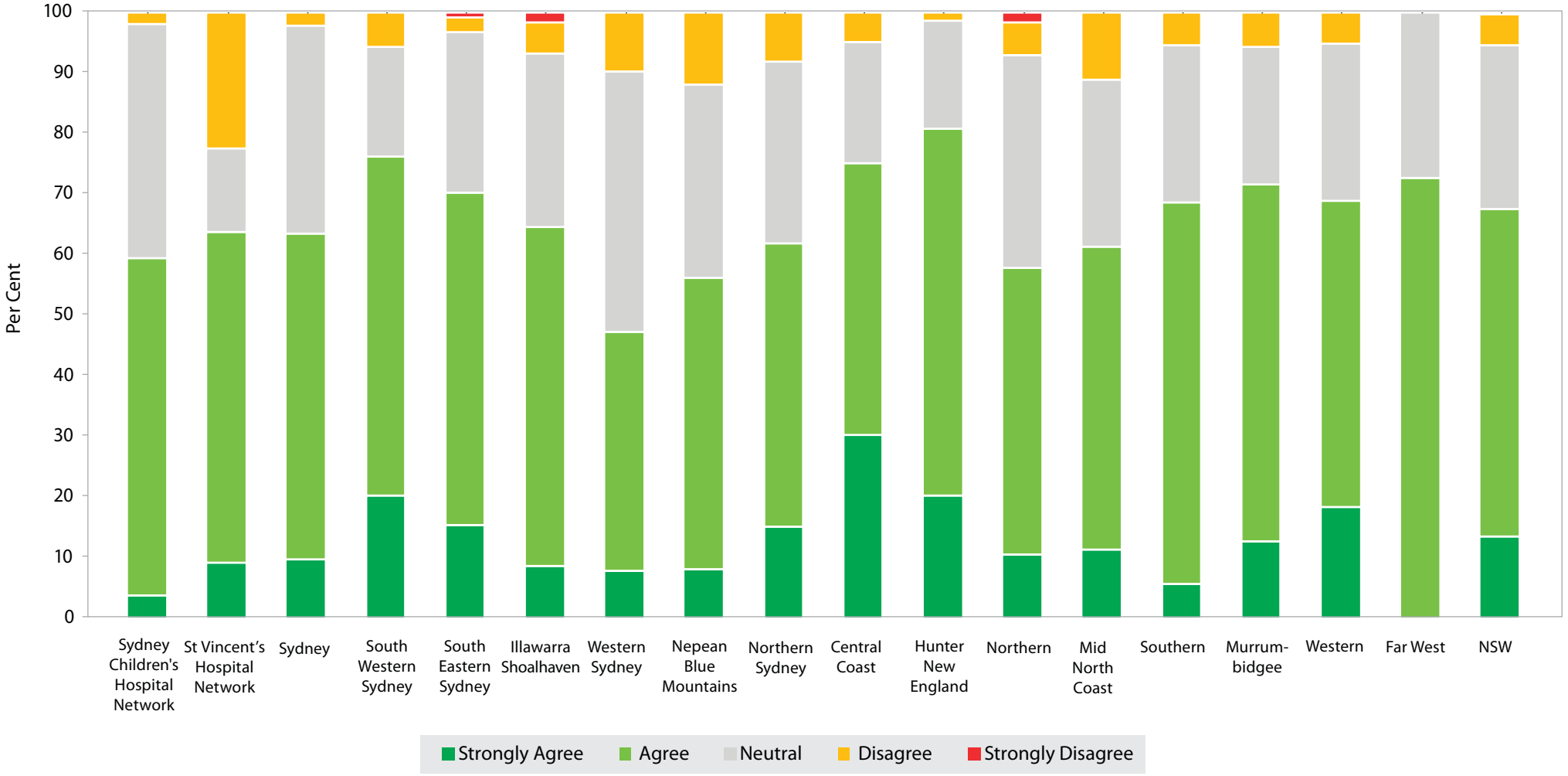
- There is a positive perception of safety culture in the system, but there appears to be some variation between LHDs in responses, that are worth investigating locally.
- Engagement by senior doctors in the quality and safety agenda is crucial to improvement efforts, yet a significant proportion of QSA respondents feel that they are not engaged. This warrants local investigation and positive efforts to improve engagement.

What we don't know: Why variation exists in perceptions of safety culture across LHDs, and what staff feel can be done to improve safety culture. How best to influence safety culture at the unit level or in local hospitals or facilities, or how best to improve the engagement of doctors in the safety and quality agenda.

We are safer than we were last year

Chart 16-13

QSA Survey 2010: We are safer than we were last year by local health district

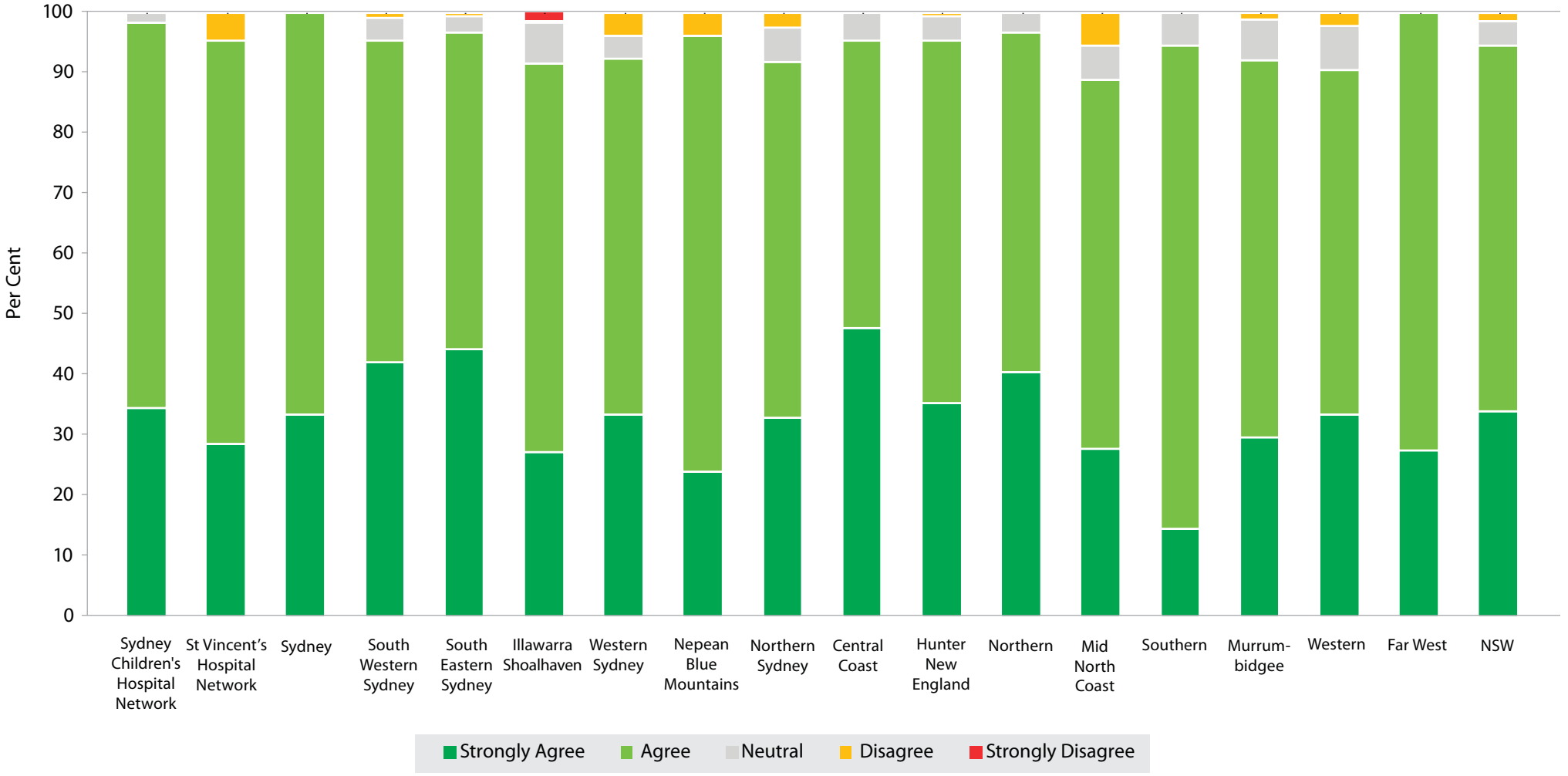


Source: Quality Systems Assessment (QSA) Program, Clinical Excellence Commission.

Positive patient safety and quality culture

Chart 16-14

QSA Survey 2010: There is a positive patient safety and quality culture within our department/unit/district/station by local health district

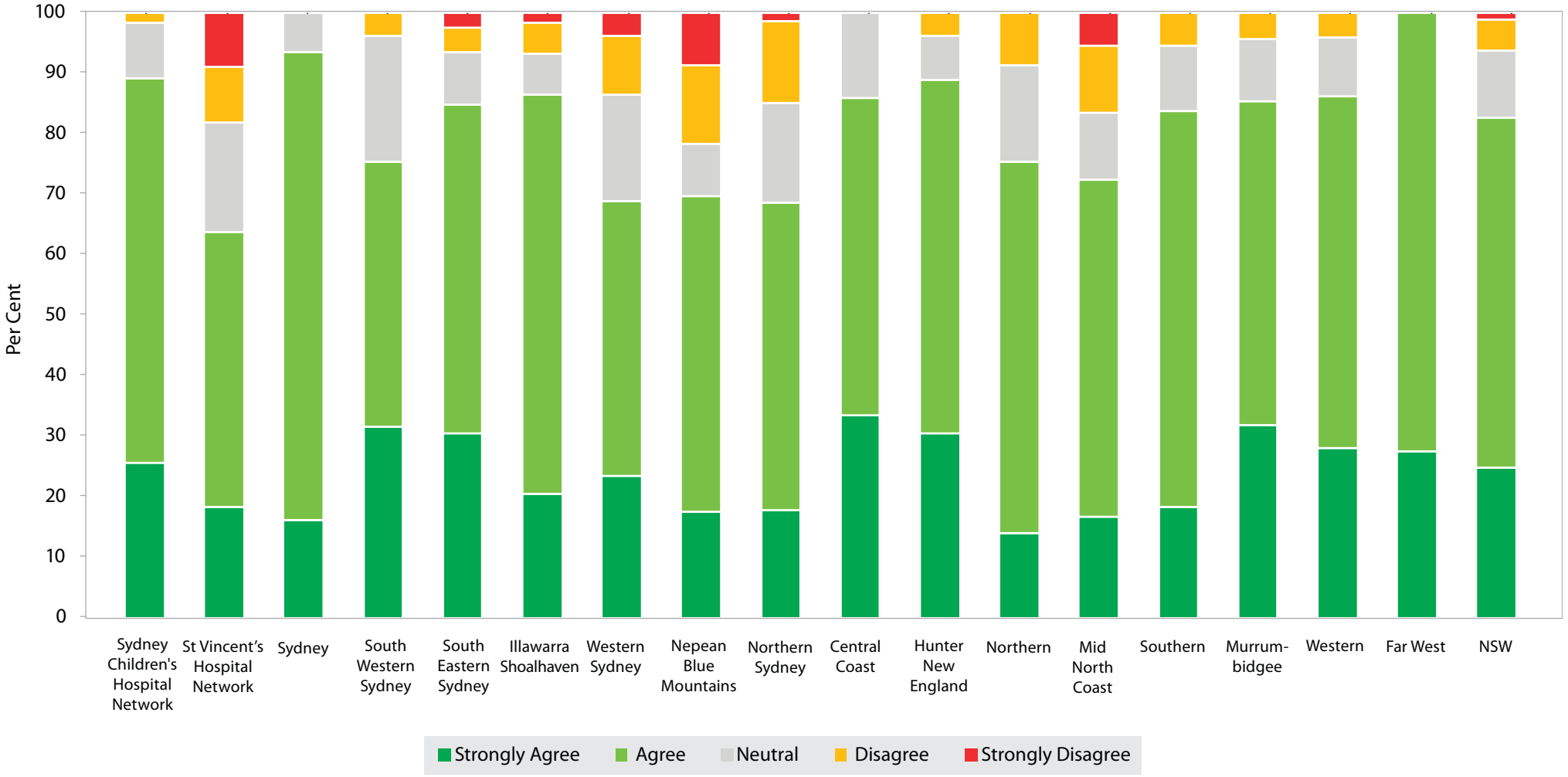


Source: Quality Systems Assessment (QSA) Program, Clinical Excellence Commission.

Facility management provides climate for patient safety

Chart 16-15

QSA Survey 2010: Facility management provides a work climate that promotes patient safety by local health district

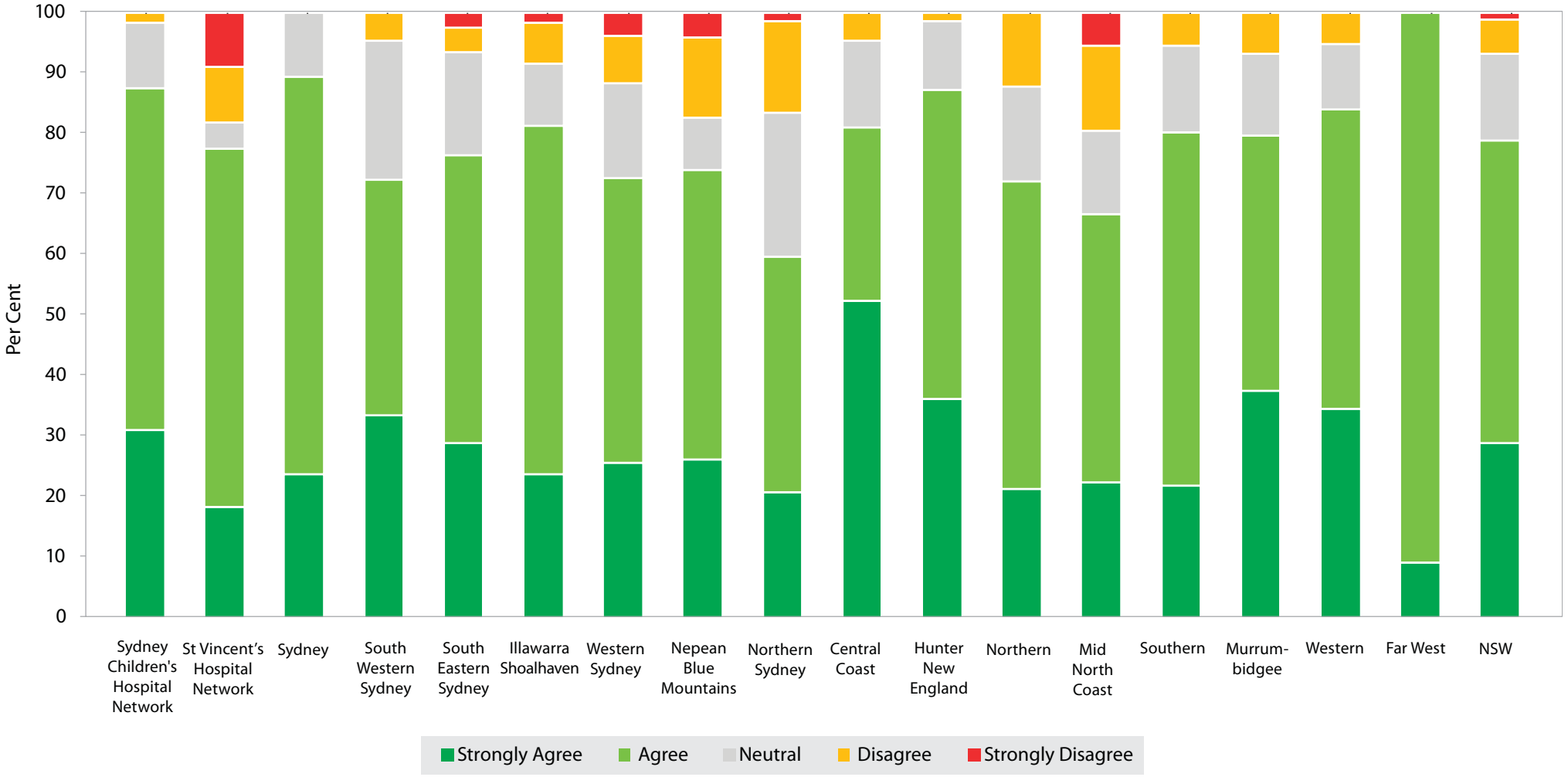


Source: Quality Systems Assessment (QSA) Program, Clinical Excellence Commission.

Senior management shows patient safety as top priority

Chart 16-16

QSA Survey 2010: The actions of senior management show that patient safety is a top priority by local health district

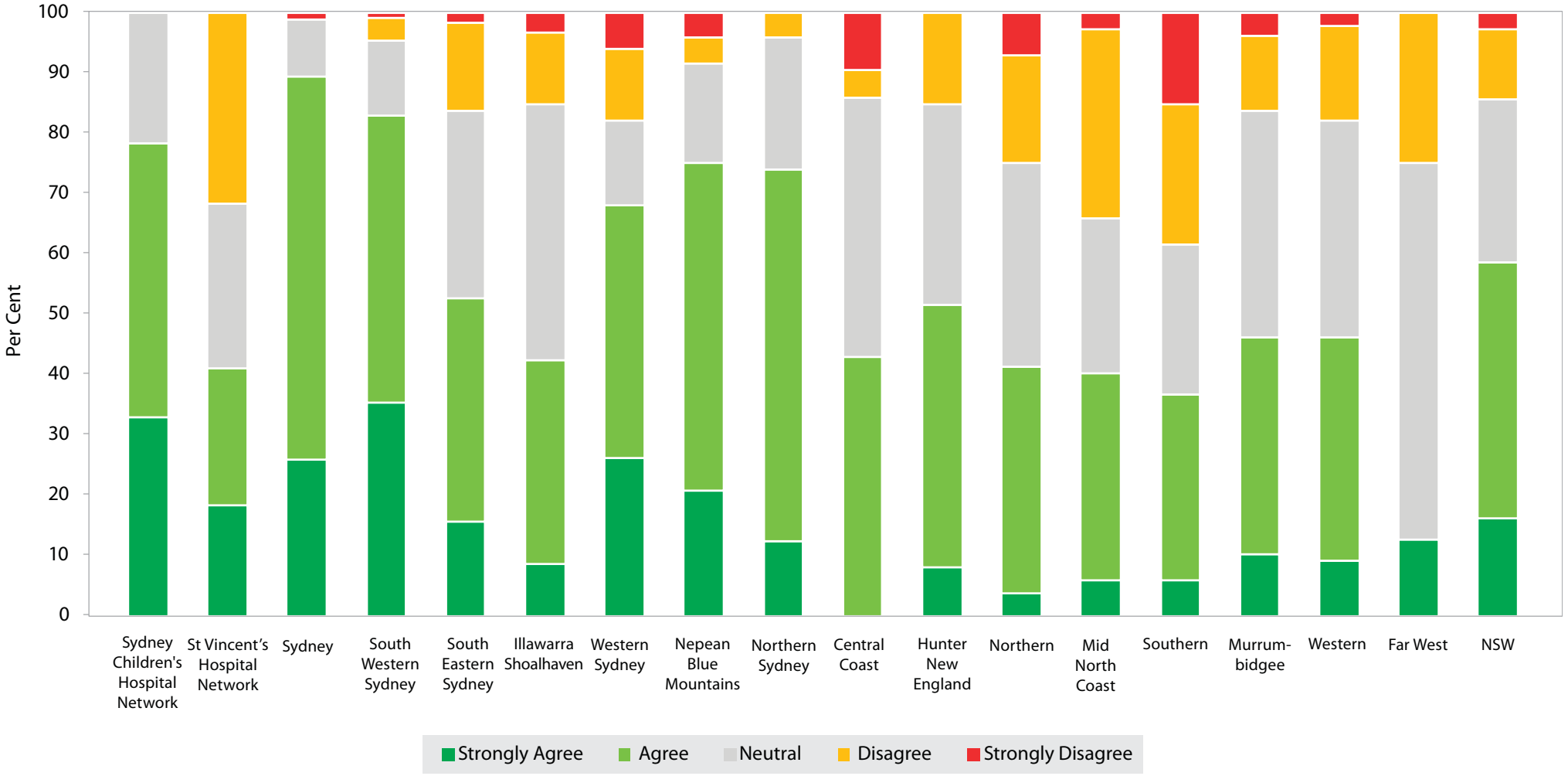


Source: Quality Systems Assessment (QSA) Program, Clinical Excellence Commission

Doctors are engaged in the quality and safety agenda

Chart 16-17

QSA Survey 2010: Senior doctors / medical officers (including VMOs) are engaged in the quality and safety agenda within our organisation by local health district

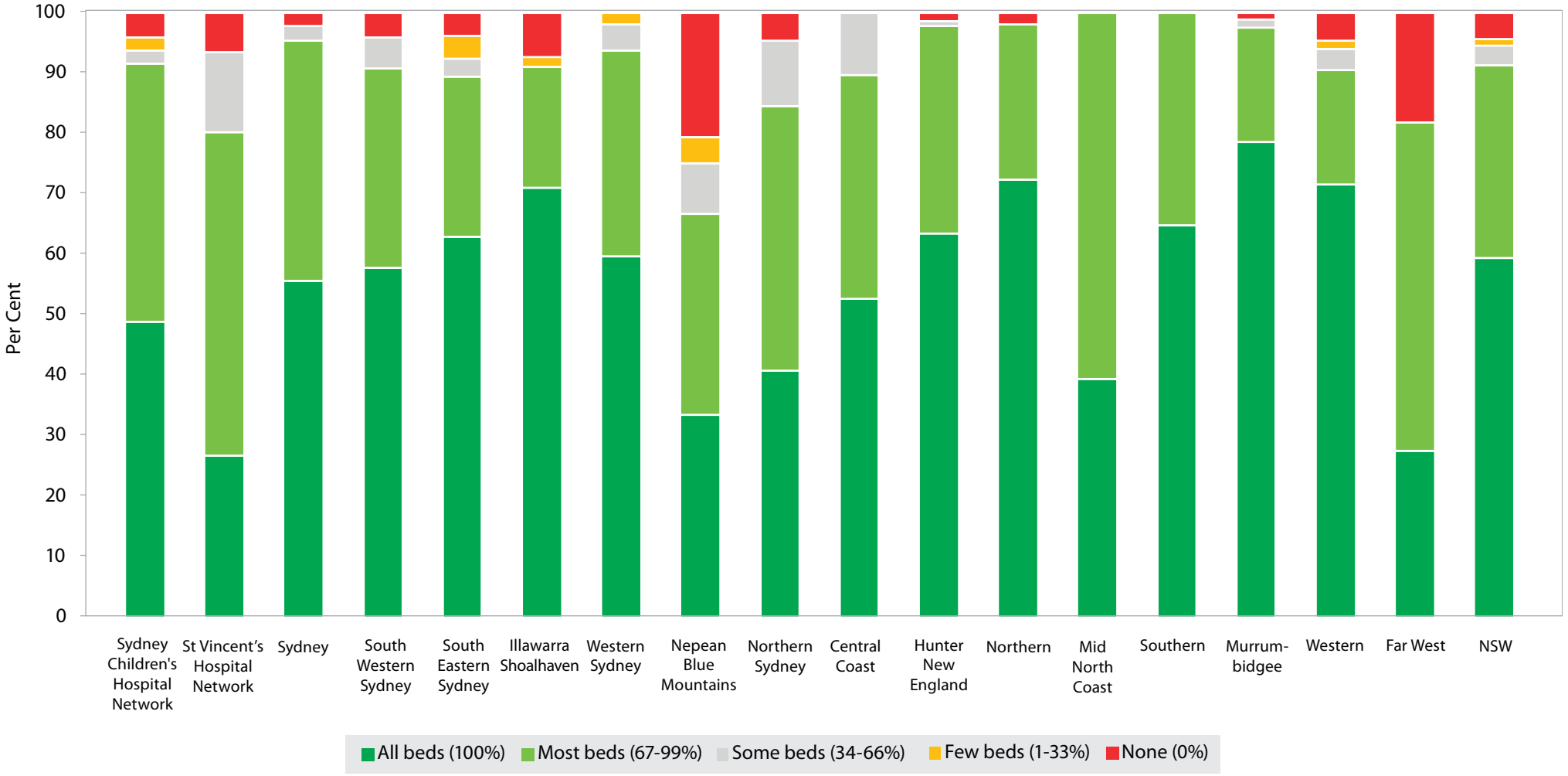


Source: Quality Systems Assessment (QSA) Program, Clinical Excellence Commission.

Availability of Alcohol-based hand rub

Chart 16-18

QSA Survey 2010: Alcohol-based hand rub is available at the point of patient care by local health district



Source: Quality Systems Assessment (QSA) Program, Clinical Excellence Commission

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Abbreviations

AACR – Australasian Association of Cancer Registries
ACDS – Australian Centre for Diabetes Strategies
ACEM – Australian College of Emergency Medicine
ACI – Agency for Clinical Innovation
ACSC – Ambulatory care sensitive conditions
ACSQHC – Australian Commission on Safety and Quality in Health Care
ACT – Australian Capital Territory
AHMAC – Australian Health Ministers' Advisory Council
AIHW – Australian Institute of Health and Welfare
AMI – Acute Myocardial Infarction
ANZICS – Australian New Zealand Intensive Care Society
ANZSCTS – Australian and New Zealand Society of Cardiac and Thoracic Surgeons
APACHE – Acute Physiological and Chronic Health Evaluation
ARIA – Accessibility/Remoteness Index of Australia
ATS – Australasian Triage Scale
BHI – Bureau of Health Information
BMI – Body Mass Index
CAD – Computer Aided Dispatch
CDC – Centre for Disease Control
CEC – Clinical Excellence Commission
CHD – Coronary Heart Disease
CHeReL – Centre for Health Record Linkage
COAG – Council of Australian Governments
COPD – Chronic Obstructive Pulmonary Disease
DOH – Department of Health
DoHA – Department of Health and Ageing
ED – Emergency Department
EMU – Emergency Medicine Unit
GDP – Gross Domestic Product
GISCA – National Centre for Social Applications of Geographic Information Systems
GMCT – Greater Metropolitan Clinical Taskforce
GP – General Practitioner
GPS – Global Positioning System
HAI – Health Associated Infections
HOIST – Health Outcomes Information Statistical Toolkit
IARC – International Agency for Research on Cancer
ICU – Intensive Care Unit
IIMS – Incident Information Management System
IRSD – Index of Relative Socio-Economic Disadvantage (and one of 5 SEIFA indices)
ISC – Inpatient Statistics Collection
LGA – Local Government Area
MAU – Medical Assessment Unit
MDC – Midwives Data Collection
MH-CoPES – Mental Health Consumer Perceptions and Experiences of Services
MHDAO – Mental Health and Drug and Alcohol Office
MSSA – Medication Safety Self-Assessment
NCAHS – North Coast Area Health Service
NETS – Neonatal and paediatric Emergency Transport Service
NHHI – National Hand Hygiene Initiative
NHMRC – National Health and Medical Research Council
NHS – National Health Service
NICE – National Institute for Clinical Excellence
NICUS – Neonatal Intensive Care Units
NMHWG – National Mental Health Working Group
NPHP – National Public Health Partnership
NSW- New South Wales
OME – Otis Media with Effusion
PECC – Psychiatric Emergency Care Centre
PSCQP – Patient Safety and Clinical Quality Program
QSA – Quality Systems Assessment
RANZCP – Royal Australian and New Zealand College of Psychiatrists
RBT – Randomised Breath Testing
RCA – Root Cause Analysis
RCT – Randomised Control Trials
SAC – Severity Assessment Code
SCRGSP – Steering Committee for the Review of Government Service Provision
SEIFA – Socio-Economic Indexes for Areas
SMR – Standardised Mortality Ratio
SSR – Standardised Separation Ratios; sSSR – smoothed Standardised Separation Ratios
SUPI – State Unique Patient Identifier
TASC – Towards a Safer Culture
VBAC – Vaginal Birth After Caesarean
WHO – World Health Organization

Former Area Health Services

GSAHS – Greater Southern Area Health Service
GWAHS – Greater Western Area Health Service
HNEAHS – Hunter New England Area Health Service
NCAHS – North Coast Area Health Service
NSCCAHS – Northern Sydney Central Coast Area Health Service
SESIAHS – South Eastern Sydney Illawarra Area Health Service
SSWAHS – Sydney South West Area Health Service
SWAHS – Sydney West Area Health Service

Local Health Districts

CCLHD – Central Coast
FMHSN – Forensic Mental Health Specialist Network
FWLHD – Far West
HNELHD – Hunter New England
ISLHD – Illawarra Shoalhaven
MLHD – Murrumbidgee
MNLHD – Mid North Coast
NBMLHD – Nepean Blue Mountains
NLHD – Northern
NSLHD – Northern Sydney
SCHN – Sydney Children's Hospital Network
SELHD – South Eastern Sydney
SLHD – Sydney
SthnLHD – Southern
StVHN – St Vincent's Health Network
SWLHD – South Western Sydney
WLHD – Western
WSLHD – Western Sydney

APPENDIX | Data sources and methods

Collections

Details of the derivation of indicators presented in this report are provided in Volume 2 of this publication, which is available on request from the CEC or at www.cec.health.nsw.gov.au. The data on which these indicators have been based is derived from a number of sources. Many of the NSW Ministry of Health data collections were accessed through the Health Outcomes Information Statistical Toolkit (HOIST) and the Statistical Application for Population Health Research and Intelligence (SaPHaRI), which is a SAS-based 'data warehouse' operated by the Centre for Epidemiology and Research of the NSW Ministry of Health. HOIST brings together most of the data collections used in population health surveillance in NSW, and contains all the available historical data for each collection. HOIST provides a common data analysis environment across the public health network in NSW [e-CHO] and Health Statistics NSW. The main data collections accessed through HOIST are described below.

NSW Admitted Patient Data Collection

The Admitted Patients Data Collection (APDC) was previously known as the NSW Inpatient Statistics Collection (ISC), and is commonly referred to as the ISC. The collection is a census of all services for admitted patients provided by public hospitals, public psychiatric hospitals, public multi-purpose services, private hospitals and private day-procedure centres in NSW. The ISC is a financial year collection from 1 July through to 30 June of the following year. The information it contains is provided by patients, health service providers, and hospitals' administration. The information reported includes patient demographics, source of referral to the service, service referred to on separation, diagnoses, procedures and external causes.

NSW local health districts and former area health services

In 2010, NSW Health announced the creation of 18 local health districts (LHDs) to replace the eight former area health services (AHSs). LHDs are a key requirement of the National Health Reform Agreement, finalised in April 2010. They have been in place from 1 January 2011, and are the result of extensive consultation with clinicians and the community. Fifteen of the new LHDs are geographically-based while three are speciality networks.

A locality variable within HOIST enables backward projections of data allowing 5-year trends to be reported by LHDs. Having this trend is the most useful presentation for trying to understand data pertaining to the current LHDs. Therefore, when describing the data, LHDs will be described as though they had always existed. When describing the administrative roles and functions of the former AHSs, the phrase "former AHS" will be used.

The CHeReL, linked ISC/APDC and deaths data

For some indicators, a special dataset linking the ISC/APDC data to data on deaths has been analysed. It was originally created by the Centre for Epidemiology and Research and is referred to as the internally linked ISC data, linked to NSW Registry of Births, Deaths and Marriages death registration and Australian Bureau of Statistics (ABS) mortality data.

These analyses are now based on data from The Centre for Health Record Linkage (CHeReL), which is a collaborative venture established by the NSW Ministry of Health and the Cancer Institute NSW, with key partners, including the CEC, University of Sydney, University of New South Wales, University of Newcastle, ACT Health and The Sax Institute. The purpose of CHeReL is, through data linkage, to enable routinely collected health data and information to be transformed into a powerful resource for planning, monitoring and evaluation of health services and outcomes. The routine availability of linked data will provide the CEC with significantly enhanced capacity to report on factors related to deaths associated with surgical and anaesthetic mortality. To December 2011*, the CHeReL has linked 42.3 million records for 8.8 million individuals within the master linkage key (http://www.cherel.org.au/master-linkage-key).

*Note: This is the number of records linked to date of publication, *not* date of data extract.

NSW Midwives Data Collection

The NSW Midwives Data Collection (MDC) is a population-based collection covering all births in NSW public and private hospitals, as well as home births. It does not receive notifications of interstate births where the mother is usually resident in NSW. The data collection has operated continuously since 1990. It encompasses all live births and stillbirths of at least 20 weeks gestation or at least 400 grams birth weight. The MDC relies on the attending midwife to complete a notification form when a birth occurs.

The form includes demographic details, and items on maternal health, the pregnancy, labour, delivery, and perinatal outcomes.

For *Timely Initiation of Antenatal Care,* the 20 week interval is chosen because pregnancies delivered before 20 weeks are called miscarriages and are not registered as births. While care in the first 12 weeks is ideal, it is very hard to collect this information; instead the MDC opted for 20 weeks. Many large hospitals expect care in the first 16 weeks or so to be provided by the GP and this data is hard to collect, even retrospectively.

Selected primipara is defined as women aged 20 to 34 years, with no previous pregnancy greater than, or equal to, 20 weeks' gestation; of a single pregnancy, with a cephalic (head-first) presentation and an estimated gestational age of 37 to 41 weeks (ACHS, 2010).

NSW Patient Experience Survey

The NSW Patient Experience Survey is one of several strategies being used by NSW Health to gain a complete picture of patient and carer experience for the purposes of health service improvement. Other strategies include the NSW Health Survey Program, patient and carer interviews and other service-specific surveys like MH-CoPES (Mental Health Consumer Perceptions and Experiences of Services; a survey of mental health clients in NSW). The NSW Patient Experience Survey is an ongoing continuous survey started in 2007. NSW is the first State in Australia to use a comprehensive Statewide survey of patients to identify key elements of the patient experience. The NSW Health Patient Survey was developed by NRC Picker (National Research Corporation) in the USA and was conducted by Ipsos Australia Pty Ltd, in conjunction with NRC Picker.

The NSW Patient Experience Survey asks patients about their recent experiences of the public health system about eight core dimensions of care valued by patients which includes: access to care, co-ordination of care (including integration), information and education, physical comfort, emotional support (including alleviation of fear and anxiety), support of family and friends, transitions and continuity of care after discharge, and respect for patient preferences (including values and expressed needs).

Each year over 200,000 surveys are mailed to patients in NSW who received inpatient and non-inpatient services within one of the following patient categories: overnight inpatients (OI); day-only inpatients (DI); paediatric inpatients (PI); adult rehabilitation inpatients (RI); non-admitted emergency patients (EP); outpatients (OP); and community health clients (CH). Approximately 80,000 patients responded to the NSW Health 2009 patient survey. Participating public health organisations include the eight former area health services and Children's Hospital Westmead. NSW Justice Health and the Ambulance Service NSW carry out separate customer survey and benchmarking activities with other like organisations.

NSW Emergency Department Data Collection

The NSW Emergency Department Data Collection is a database of information collected from approximately one-third of NSW emergency departments. It represents approximately two-thirds of all NSW emergency patients. For this report, analysis of the Emergency Department Data Collection was undertaken by the former NSW Department of Health.

NSW Elective Surgery Waiting Times Data Collection

The Elective Surgery Waiting Times Data Collection is a database of information collected on patients for whom for surgery and selected medical procedures are planned. Previously, this has been known as 'elective surgery' or 'booked treatment'. For this report, analysis of the elective surgery waiting time data collection was undertaken by the former NSW Department of Health.

Cancer Institute NSW

The Cancer Institute NSW was established in July 2003 to lessen the impact of cancer in NSW. *Chartbook 2010* presents data investigating the relationship between surgical volume and outcomes in the NSW setting. Based on a join point analysis investigating the relationship between 30-day hospital mortality and hospital volume, the Cancer Institute NSW identified the threshold at which surgical volume predicted mortality for a number of surgical cancer procedures. Data was sourced from the NSW Central Cancer Registry linked to the NSW Admitted Patient Data Collection for the years 2005-2008. The volumes of procedures undertaken by hospitals in these four years were averaged to produce an average annual number of procedures for each facility. Results are reported by NSW Ministry of Health hospital peer groups.

Mental Health and Drug and Alcohol Office (InforMH)

Data pertaining to the performance of Mental Health facilities within NSW was obtained from the InforMH unit within the Mental Health and Drug and Alcohol Office (MHDAO). The proportion of separations from acute adult mental health units which were the result of a re-admission within 28 days to the same facility included:

- Mostly adults and older people in acute public psychiatric units in general hospitals
- Patients who are admitted to a mental health unit on a same-day basis are excluded
- Children's units are excluded, except Redbank and Gna Ka Lun, because they cannot be separately identified from the adult unit
- Patients with a mental health diagnosis in a general ward are excluded.

Australian and New Zealand Society of Cardiac and Thoracic Surgeons (ANZSCTS)

ANZSCTS data collection (formerly the Australasian Society of Cardiac and Thoracic Surgeons - ASCTS) gathers information pertaining to cardiac procedure volumes at participating NSW hospitals. Data was obtained from the curators of the data collection at the Department of Epidemiology and Preventative Medicine at Monash University.

Australian and New Zealand Intensive Care Society (ANZICS)

Data was obtained from ANZICS and analysed by the CEC.

The ANZICS Research Centre for Critical Care Resources (ARCCCR) designs and distributes surveys to all ICUs to obtain this information. As a result of its research activities, the ARCCCR holds a significant collection of data on intensive care resources. This research is quality-oriented and directed toward intensive care infrastructure, workforce profiles and processes of care. The annual surveys completed by ICU staff assist in monitoring trends in intensive care service delivery. The surveys conducted by ARCCCR focused on the distribution and features of critical care units, medical and nursing workforce data, as well as selected quality indicators and mass casualty disaster planning. The ARCCCR surveyed Australian and New Zealand critical care units in both the public and private sectors. The ANZICS report is intended to be an information resource for intensive care staff, public and private healthcare providers, policy makers and relevant statutory bodies.

Ambulance Service NSW

Data was obtained from the Ambulance Service NSW. Interpretation of the data had significant input from senior staff at the Ambulance Service NSW.

Blood Watch

Data for Blood Watch is maintained and analysed by the CEC.

Blood Watch is a NSW Statewide transfusion medicine improvement program and its primary goal is to improve the safety and quality of fresh blood product transfusion in all NSW public hospitals. The program has been in place since 2006 and is centrally co-ordinated through the CEC. In keeping with national trends in improvements in transfusion medicine, the Blood Watch program has focused on six priority areas: appropriateness of blood component therapy, reporting of adverse transfusion related events, clinical governance issues, accurate costing of transfusion medicine, ongoing education of healthcare professionals, and communication of policy to address supply and demand issues. The Blood Watch program is supported by all NSW local health districts and the Australian Red Cross Blood Service.

Hand Hygiene

Data for hand hygiene is maintained and analysed by the CEC.

Auditing of hand hygiene compliance is used to evaluate hand hygiene behaviour within the workplace and to identify opportunities for education and promotion of correct hand hygiene. Audit data is submitted to the Clinical Excellence Commission and analysed three times a year. Hand hygiene compliance is measured at ward, hospital and local health district level by the Clinical Excellence Commission and nationally by Hand Hygiene Australia. Data for Chartbook 2010 is presented by former area health services.

Auditing of hand hygiene compliance in NSW is according to the 5 Moments for Hand Hygiene methodology developed by Hand Hygiene Australia, which is based on the World Health Organization program *Save Lives Clean your Hands*. Auditors undergo standardised face-to-face training and must attain a pass mark of 90 per cent to be validated to observe and audit hand hygiene behaviour. Auditing of observed hand hygiene Moments includes hand washing or use of alcohol rub at one of the 5 identified moments for hand hygiene, before or after patient contact. Compliance can be defined as either washing hands with soap and water or rubbing with an alcohol rub in accordance with a hand hygiene Moment.

Incident Information Management System (IIMS)

Data for the Incident Information Management System (IIMS) is jointly maintained by the CEC and NSW Health and analysed by the CEC.

The objective of IIMS is to provide an electronic system that records all healthcare incidents, adverse events and near-misses, in four categories:

- clinical (patients)
- complaints
- staff/visitor/contractor (occupational health and safety)
- property/hazard/security.

This data assists managers to manage the incidents that occur in their area, records the results of reviews or investigation of incidents and provides reports on all incidents that have been recorded in the system. The system was deployed to each of the former area health services in November 2004 and collects information from the 17 local health districts within NSW (including Justice Health, The Children's Hospital Network, St. Vincent's Hospital Network and Ambulance Service NSW) for clinical incidents that occurred in the period under review.

Age-adjusted Rates

Where indicators have been standardised for age and sex, the direct standardisation method has been used. This method adjusts for effects of differences in the age composition of populations across time or geographic regions. The directly age-standardised rate is the weighted sum of age-specific (five-year age group) rates, where the weighting factor is the corresponding age-specific standard population. For this report, the Australian estimated residential population (persons) as at 30 June 2001 was used as the standard population. The same population was used for males and females to allow valid comparison of age-standardised rates by sex. Ninety-five per cent confidence limits around the directly standardised rates were calculated, using the method described by Dobson *et al*., (1991). Where an indicator relates to mortality following a particular event or procedure, the standard population used is a relevant population experiencing the event or procedure. Direct standardisation is also used for Aboriginal populations as described by the AIHW and ABS (AIHW, 2011d).

Small numbers

Although directly standardised rates can summarise trends across strata, this method is considered statistically unreliable when based on less than 20 events in any one age group. When the rates are based on only a few cases or deaths, it is almost impossible to distinguish random fluctuation from true changes in the underlying risk of disease or injury. For this reason, it is important to know the count of the underlying events from which the rate or percentages were derived. If the number of events is small, the 95 per cent confidence intervals of the rates become very wide and should be interpreted with caution. Comparisons over time or between communities that are based on unstable rates can lead to spurious conclusions about differences in risk which may or may not be valid.

Standard approaches include using larger geographic catchments, aggregating and averaging data over several years, or omitting the data.

In some places in the Chartbook, the CEC has adopted these approaches. Examples include:

- Combining remote & very remote ARIA classes as in Chart 11-2

Where rates have been published, but confidence intervals remain wide, caution should be exercised when comparing annual LHD – or other – data.

Socio-economic status measures

Many of the indicators were analysed to determine whether there were systematic variations across socio-economic status groups. The analysis was based on the statistical local areas (SLA) of patients' residence. The ABS assigns all Australian SLAs with an index of relative socio-economic disadvantage (IRSD), one of the socio-economic indices for areas (SEIFA) produced by the ABS (ABS, 2008b). Non-overlapping geographical areas covering all NSW are assigned an IRSD score calculated from ABS census data on various socio-economic characteristics of the people living in the areas. These characteristics relate to occupation, education, cultural and linguistic diversity, indigenous origin and the economic resources of the household. In this report, the NSW population was divided into five groups based on the IRSD scores of their SLA of residence. This means that SLAs were sorted by IRSD score and assigned to population-weighted quintiles, each containing close to one-fifth of the total population.

Rurality

Many of the indicators were analysed to determine whether there were systematic variations in metropolitan, rural and remote areas of NSW (rurality). The analysis was based on the patients' SLA of usual residence. Each SLA is assigned an ARIA+ score. ARIA+ is the new enhanced Accessibility-Remoteness Index of Australia classification. In ARIA+ the remoteness index value is based on road distance to each of five categories of 'service centre'. The service centre categories are based on population size, with the smallest centres having populations of 1,000-4,999. Localities with populations of greater than 1,000 persons are considered to contain at least some basic level of services (e.g. health, education, or retail) (DOHA, 2001). Service centres with larger populations are assumed to contain a greater level of service provision. ARIA+ scores range from 0 to 15, and are grouped into remoteness categories. There are five classes of remoteness: major cities, inner regional, outer regional, remote and very remote (AIHW, 2004). For select indicators, the classes remote and very remote have been combined, due to small population sizes.

Public and/or private hospitals

Chartbook data showing hospital separations includes both public and private hospitals in NSW. For select indicators from the ISC, the data was examined to assess the proportion of separations in a public or a private hospital. Public or private hospital status was ascertained using the hospital role (ISCOS v10+), and classified as a public hospital, a private hospital, or unassigned. Note that a large proportion of the unassigned category includes interstate separations, which are not complete for the two most recent years of data.

NSW Ministry of Health definition of hospital beds (refer to Table 2)

Hospital bed: Number of beds are reported as average for the month of June, being the last month of each financial year. During the course of a year, average available bed numbers vary from month to month, depending on the underlying activity.

Beds available for Emergency Department (ED): These beds are the categories of beds that are usually required for admission from the emergency department.

Other beds: Other beds include Hospital in the Home and residential/community aged care & respite beds.

Emergency or planned status

For selected indicators from the ISC, the data was examined to assess the proportion of separations with an emergency or planned admission status. This was defined from whether the patient required immediate emergency status upon admission and was classified as having an emergency status, a planned status if the separation was planned, or a regular same-day planned admission, or other, if the admission status was for maternity/newborn, or another admission.

Truncated Y-Axis

In datasets containing a wide range of values, patterns and variation can be overwhelmed by exceptionally large values. For charts in this edition, we have truncated the y-axis in order to clarify relationships between LHDs, particularly when relationships were obscured by wide confidence intervals. Examples can be found in Charts 2-3, 2-10 and 9-9.

APPENDIX | Chapter endnotes

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